SYMONS'S

MONTHLY

METEOROLOGICAL

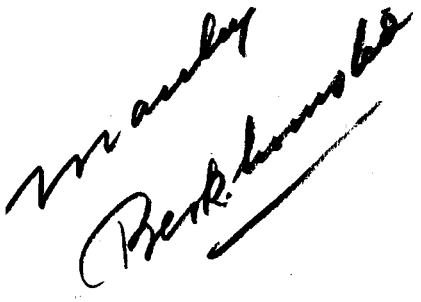
MAGAZINE.

METEOROLOGICAL OFFICE
19 NOV 1919
PROOF

VOLUME THE THIRTY-FIRST.

1896.

LONDON:
EDWARD STANFORD, COCKSPUR STREET, S.W.
—
1897.



LONDON:
G. SHIELD, CHELSEA AND BROMPTON.

1897.

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ERRATUM.

We regret that through shortness of time the table on p. 181 of our last volume was not checked through against the originals, and that thus three ,, ,, ,, became misplaced, and one hour was quoted wrongly. The following correction should be made in ink,

1825..... Jan. 9th ... Kinfauns—for "9" a.m. read "10" a.m.

and the following strip should be cut off, and pasted over the upper part of the table:—

					in.
1778.....	Dec.	26th ...	London, Royal Society	2 p.m.....	30·918
,, ...	,,	,,	,, Sir G. Shuckburgh ...		30·935
1808.....	Feb.	24th ...	Gordon Castle, Banffshire	9 p.m.....	31·007
1820.....	Jan.	8th ...	,, ,, ,, ...	11 p.m.....	31·046
,, ...	,,	,, ...	Kinfauns, Perthshire	11 p.m.....	31·014
,, ...	,,	9th ...	,, ,, ...	9 a.m.....	31·056
,, ...	,,	,, ...	Leith	9 a.m.....	31·065
,, ...	,,	,, ...	Hermitage Hill, Leith	9 a.m.....	31·050

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXI.] FEBRUARY, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

OUR THIRTY-FIRST VOLUME.

IT does not often happen that the same person writes the Introduction to the first, and to the thirty-first, annual volume of a periodical, and it must be still more rare for an Editor to be able to look back upon 360 consecutive monthly numbers and to remember only one which appeared without his personal supervision, and certainly the uniform health which has rendered it possible for me to do so demands thankful recognition.

When starting my small craft I had little encouragement, for a somewhat similar but, in some respects, better manned vessel had been started and had foundered within six months; but I thought that some such periodical was needed, and launched my little bark with a brief Introduction which closed with the following sentence:

> "Lastly, I need hardly say, that its future depends very much upon its readers; if they will send me prompt and full information of any unusual occurrence in their neighbourhood, and if they will (if they think it good) recommend it to their friends, the two essentials of high quality and a paying circulation may be obtained, and so I may be able to enlarge it, though my maxim always is, say everything in as few words as possible."

My readers did help me, and so we have gone on these thirty years, and though of course many have passed away, I see that nine of the writers in the first number (and also the printer) are with us still. As to how the craft has been steered it is not for me to say, but of one thing I am very proud, viz., that (perhaps because it is so small) the *Meteorological Magazine* is not merely taken in, but it is *read*. I try hard to avoid mistakes, but whenever a misstatement occurs, I hear of it, and no Editor could receive a higher compliment.

GENERAL INDEX.

There is one point upon which I should be glad to know the opinion of my readers. Would they like to have a *General Index to the "Meteorological Magazine," Vols. I.–XXX?* It would take a long time to prepare, and it certainly "won't pay." I think that it would be

useful, but my judgment may be biassed. I therefore issue with this number a sort of voting paper so that those who desire it may intimate their wish.

And now with thanks to those who have helped in the past, and relying upon similar aid in the future, I must proceed with that editorial work which has always been a duty and a pleasure.

G. J. SYMONS.

62, *Camden Square, N. W., February 11th*, 1896.

THE MILD WINTER.

THE contrast between the severe frost of February, 1895, and the mildness of January and of the first half of February, 1896, has led to the printing of some very random statements. We give a few facts which will show that, though mild, there has been nothing very exceptional:—

Shade Temperatures at Camden Square, London.

		Absolute Max.	Absolute Min.	Mean Max.	Mean Min.	Mean.
		°	°	°	°	°
1895.....	Dec.	56·4	26·1	44·9	35·2	40·0
1896.....	Jan.	52·7	28·0	45·4	36·5	41·0
1868.....	Dec.	58·2	31·5	50·7	41·0	45·8
1869.....	Jan.	56·3	25·0	46·3	35·9	41·1
1876	Dec.	56·6	23·2	47·8	40·4	44·1
1877.....	Jan.	56·4	28·5	48·5	37·4	42·9
Number of years with higher values than 1895-6.	Dec.	11	13	16	16	17
	Jan.	23	4	11	8	11
1868.....	Dec.	58·2	31·5	50·7	41·0	45·8
1895.....	,,	56·4	26·1	44·9	35·2	40·0
1868 warmer by ..		1·8	5·4	5·8	5·8	5·8
1884.. ...	Jan.	55·6	32·2	48·8	39·2	44·0
1896.....	,,	52·7	28·0	45·4	36·5	41·0
1884 warmer by		2·9	4·2	3·4	2·7	3·0

The temperature of December, 1895, was about 1° above the average, and was therefore in no way remarkable. The temperature of January, 1896, was about 3° above the average, but, as is shown above, has been exceeded in eleven years out of the last 36, or about every third year. In January, 1884, the air temperature never fell to freezing point, and the whole month was 3° warmer than January, 1896.

The fact is, the excessive frost of February, 1895, has impressed the public mind with the idea that our winters are usually something like it. We are very thankful that they are not.

ROYAL METEOROLOGICAL SOCIETY.

THE annual meeting of this Society was held on Wednesday evening, January 15th, at the Institution of Civil Engineers, Mr. R. Inwards, F.R.A.S., President, in the Chair.

The Report of the Council showed that the Society was in a satisfactory condition, 34 new Fellows having been elected during the year.

Mr. Inwards devoted his Presidential address to the subject of "Meteorological Observatories," which he illustrated by means of photography. After describing some ancient observatories, including the Nilometers, and the Tower of the Winds, at Athens, he gave an account of National Observatories, of which the Royal Observatory, Greenwich, was taken as a type. High level observatories were next described, of which that of Mont Blanc was taken as a type. Special reference was also made to the Observatory on the Sonnblick, the high level observatory at Arequipa on the Andes, and that on Ben Nevis. An account was next given of Tower Observatories, together with some of the results obtained from the Eiffel Tower at Paris. Mr. Inwards, in concluding, said: "One can figure to one's self a tower piercing the air from any of the elevated table lands of this country, Salisbury Plain, the Stray at Harrogate, or the downs between Guildford and Dorking,—and from which the most interesting results could not fail to accrue. It is the opinion of M. Vallot, no mean authority, that a high tower is for air observatory purposes equivalent to a mountain station of ten times the altitude; and this is evident when one considers that any mountain must act as an obstacle which thrusts upwards the strata of the atmosphere into a form almost like its own, so that some of the effects are very little different from those observed below; while a tower like the Eiffel Tower thrusts itself into the air without obstructing its movements. It is the boast of the Royal Meteorological Society that it is gradually covering the country with a network of private observing stations, and is collecting together for the enlightenment of all future time, a mass of accurate knowledge on the subject of the changes in our atmosphere, its varying moods, its beating pulses, its calms and its convulsions, so that when the philosopher is born who is destined to unravel all its mysteries, he will have the tools and instruments ready to his hand."

Mr. E. Mawley, F.R.H.S., was elected President for the ensuing year.

THE HIGH PRESSURE IN JANUARY.

In the first place, we have to express our regret at the mistake on p. 181 of our last volume, which requires correction by pasting the annexed slip over the upper portion of the table, and making the one other correction thereon mentioned.

Secondly, we have to record that a second maximum, also exceeding 30·9 inches, occurred at 11 a.m. on January 30th. The following little table contains all the instances of pressure exceeding 30·8 inches at Camden Square since 1858, and clearly shows how very remarkable it was for 30·9 to be exceeded on two occasions *within one month*:—

			in.
1859.....	Jan. 9th	11.40 p.m..... ...	30·830
1873.....	Feb. 18th	11.0 a.m.....	30·846
1879.....	Dec. 23rd	10.0 a.m.....	30·813
1882.. ...	Jan. 18th	10.30 a.m.....	30·975
1896.....	Jan. 9th	9.0 p.m.....	30·934
,, ...	Jan. 30th	11.0 a.m.....	30·927

It is noteworthy that all these maxima occurred between the hours of 9 and 12, *i.e.*, close to the time of maximum barometric tide.

Thirdly, we are very glad to mention that at the meeting of the Royal Meteorological Society on February 19th, Mr. R. H. Scott, F.R.S., will read a paper entitled, "Notes on the recent unusually high Barometer readings in the British Isles."

HIGH MONTHLY MEAN.

In London the mean pressure for the whole of January was very high, the readings, corrected and reduced, give 30·358 in. for 9 a.m. and 30·376 in. for 9 p.m., or (applying the correction for diurnal range) a mean for the month of 30·360 in., which has been exceeded only twice since the Camden Square record began, viz., in January, 1880, when the mean was 30·370 in., and in February, 1891, when it was 30·472 in. It is rather curious that the mean pressure in February, 1891, passed without special notice either in the publications of the Royal Meteorological Society or in the *Meteorological Magazine*—all our space and thought were apparently devoted to the drought.

The following table, compiled chiefly from a very valuable paper by Mr. Storks Eaton in Vol. vi. of the *Quarterly Journal* of the Roy. Met. Soc., and continued to date from our own observations, proves at once that, while pressure in January, 1896, has been remarkable (equalled about once in 15 years), that of February, 1891, was unprecedented as far as records extend.

Monthly Mean Pressures in the vicinity of London of 30·360 *in. or upwards.*

		in.			in.
1779.....	January	30·387	1854.... .	March	30·374
1780.....	December ...	30·401	1880.....	January	30·370
1797.....	February.....	30·400	1891.....	February... ..	30·472
1834.....	December ...	30·364	1896.....	January	30·360
1843.....	,, ...	30·423			

VIOLENT LIGHTNING STROKE IN SOUTH DEVON.

MR CHANDLER, of Torquay Observatory, has favoured us with the cutting from a local paper which we reprint below. It is not easy to follow the narrative, and some statements seem improbable. It would have been both interesting and useful if some of our Devonshire readers had investigated the matter promptly, photographed the damage, and made a plan of the premises. Possibly even now something could be done. The story of the electric ball travelling "in an easterly direction, tearing up the ground in its course, until it reached the small wheel-house," ought to be capable of verification or contradiction even now.

THUNDERSTORM AT BRIXHAM.

WEDNESDAY, DECEMBER 18TH, 1895.

A MAN KILLED, OTHERS INJURED.

A thunderstorm broke over Brixham yesterday morning shortly before ten o'clock. Heavy showers of rain had fallen at intervals, from an early hour up to the time of the storm, when a bright blue sky with heavy white clouds and sunshine existed. The wind, which was blowing very moderately from the S.E., continued without any variation. Two bright flashes of lightning and two terrific peals of thunder were all that were seen or heard in the town generally, but in a field at Furzeham, part of which was occupied as a twine-walk, and where two men and a boy were at work, an electric ball or thunderbolt was observed by them in the west, and to travel in an easterly direction, tearup the ground in its course until it reached the small wheel-house, where the boy sits to turn a small wheel for the spinners. The door of this small house was closed, and the fluid striking it shattered its lower part, and, passing on, knocked a hole right through the wall, and, making its exit through, flew upwards, striking the gable end of the roof of Mr. J. Varwell's ropery, knocking down the masonry and partially unrooting the establishment. It then entered the ropewalk and travelled 20 yards, damaging the side wall in its course, until it reached four men who were at work close together making yarn. The names of the men are William Morey, James Lowe, Edward Mitchell, and Samuel Webber. Morey, who happened to be stooping at the time, was struck on the top of the head and killed instantly; Lowe, who was close to him, was struck across the abdomen and laid helpless, though he never lost consciousness; Mitchell received a severe shock in both legs and was knocked down, but it did not injure him; Webber escaped free. As soon as possible medical aid was sent for, and in a short time Drs. Elliott and Hayward were on the spot, and every effort was made by them to restore animation in Morey but without avail, and his body was conveyed to his home. The injuries to Lowe were of such a nature as to necessitate his being kept at the residence of the foreman of the works until one o'clock, when he was taken home. His condition is critical. A railway porter and another man in the employ of Derry and Co., carriers, both of whom were in the goods shed, received severe shocks. One said he felt dazed and had pains about his body. Fishermen at the moorings in the outer harbour report that the electric fluid ran along the chains on the decks of their vessels, and that on Monday night at sea the crew

of one fishing vessel saw three electric or phosphorescent balls on their mast and rigging. Such are often seen, but seldom more than one at a time. William Morey was single and 38 years of age. Hundreds of persons visited the ground in the neighbourhood of Mr. Varwell's Ropery, where the ground is torn up for upwards of a hundred yards. Such a thing has never been known in the district before.

REVIEWS.

Régime des pluies de la péninsule Ibérique, par M. ALFRED ANGOT—[Excerpt Annales Bureau central Météorologique de France, 1893, Tome 1]. 4to, 38 pp., 4 plates.

Sur le régime pluviométrique de l'Europe Occidentale, par M. A. ANGOT—in Annales de Géographie, No. 19, Oct. 15, 1895. A. Colin and Co., Paris; 8vo, 10 pp., 1 folding coloured map.

M. ANGOT is to be congratulated on having finished a heavy piece of work, which he has apparently spared no pains to make accurate.

The two portions of it which we have now to notice, are to some extent complementary to, and explain, each other.

The task which M. Angot has undertaken is that of ascertaining the mean rainfall of Western Europe—no slight labour in any case, but augmented considerably by the mode in which the work has been done. M. Angot, in the first place, decided that he would get rid of all irregularities due to secular change, by utilizing for all stations the same 30 years (1861-90), and where the record did not cover the full 30 years he has computed the value by differentiation from three or four surrounding stations—and this he has done not merely for the yearly totals but for each month. The result of this is, that whereas there are in the whole of Spain and Portugal only 9 stations of which the records are perfect for the whole 30 years, there are 79 others for which the monthly means for the 30 year period have been computed from all available data. M. Angot is in no way whatever responsible for the shortness of many of these records, and he has made the best of them, but we think that it would have been well to give in the tables on pages B 165 to B 167 the number of years' records upon which the computed values were based. As the table stands, the figures for Burgos, Palencia and Soria look equally important, but though the first and last are based upon observations during 29 years, the mean for Palencia is based upon only two complete years, and the record looks to us so doubtful that we believe that M. Angot would have given better values for Palencia if he had invented them all. Either the number of years from which each mean had been computed should have been stated, or all those based upon less than 15 years should have been printed in different type.

On p. B 176, M. Angot discusses the variation in annual fall from year to year for 21 stations, and brings out some such very startling

results, that we have taken five colums from his table on page B 176, arranging the stations in the order of the amount of their mean rainfall, and adding three columns.

TABLE.

	Mean Rain-fall.	Max. yearly fall.	min. yearly fall.	Ratio. $\frac{M}{m}$	Mean Rain-fall.	Mean being 100. Max. yearly fall.	Min. yearly fall.
	mm.	mm.	mm.		inches.		
Santiago	1652	2336	942	2·5	65·04	141	57
Bilbao	1247	1728	902	1·9	49·10	139	72
Porto	1226	2110	606	3·5	48·27	172	50
Oviedo	935	1264	640	2·0	36·81	135	69
Guarda	898	1647	457	3·6	35·36	184	51
Gibraltar	822	1383	371	3·7	32·36	168	45
San Fernando	744	1236	390	3·2	29·29	166	52
Lisboa	726	1145	438	2·6	28·58	158	61
Soria	594	851	281	3·0	23·39	143	47
Huesca	591	857	345	2·5	23·27	145	58
Burgos	563	777	320	2·4	22·17	138	57
Campo Maior	560	886	302	2·9	22·05	158	54
Barcelona	537	978	272	3·6	21·14	182	51
Valencia	486	1288	191	6·7	19·13	266	39
Sevilla	471	880	159	5·5	18·54	187	34
Palma	453	669	239	2·8	17·84	148	53
Alicante	446	936	204	4·6	17·56	210	46
Madrid	419	698	259	2·7	16·50	167	62
Murcia	380	765	193	4·0	14·96	201	51
Zaragoza	314	426	215	2·0	12·36	135	68
Valladolid	313	442	142	3·1	12·32	141	45

We do not know whether there is anything in Spain and Portugal different from all other parts of the world, or whether the observations have been wrongly made, but the range between the wettest and the driest years is much above what we have heard of in any other country. Usually the wettest year has scarcely half as much again as the mean, *i.e.*, 150 per cent., but at 12 out of the above 21 stations the ratio exceeded 150, and at three stations exceeded 200, and reached 201, 210 and 266 respectively.

So with reference to dry years, the fall in a single year may in rare cases go down to half the average, or to a ratio of 50, but 6 of these 21 stations go below that, and two of them below 40. In our notice of Dr. Hellmann's work upon the same subject, written nearly 10 years ago (*Met. Mag.*, xxiii. (1888), p. 82), we called attention to the same feature, and there can be no doubt that Central Spain is liable to exceptionally severe droughts.

Here, for instance, is a list of yearly totals, all below seven inches :—

Albacete	1867	...	6·97	Salamanca	1875	...	4·88
Badajoz	1871	...	5·08	Sevilla	1874	...	6·26
Lerida	1882	...	6·58	Valladolid	1875	...	5·59
Palencia	1890	...	6·42				

As regards the means, we have compared the values for stations given both by Dr. Hellmann and by M. Angot, and we find that there are 21; that as to 8 they agree within an inch, and as to 14 they agree within two inches, and in only two cases, Valencia and Porto, do they differ more than three inches (3·2 in. and 4·3 in.); the mean difference is less than half-an-inch.

M. Angot does not like the raininess of the months being indicated by the percentage of the yearly total which falls in each, because the months are of unequal length. We object as strongly as anyone to the shortness of February, and think that posterity will wonder why it has been allowed to be too short for so many years, but as long as the months are as they are, and retain their present names, so long do we think that it would be a pity to attempt to correct for the irregularity. We do not think that at present there is any more simple and effective mode of treatment than the old one of percentages.

However, we must pass on to M. Angot's other paper; and here we have evidence of the mass of work which he must have done, for we have a map with seven shades of tinting for mean rainfall of, roughly, under 16 in., 16 in. to 20 in., 20 in. to 24 in., 24 in. to 32 in., 32 in. to 40 in., 40 in. to 60 in., and over 60 in., and this for the whole of Europe west of the meridian of Rome up to lat. 60° N., and including parts of Germany, east of Berlin, and of Norway, and Sweden. The printing is so sharp, and the scale of the map such, that the boundaries of the areas can be read within two or three miles, and the number of patches representing areas of 20 or 30 square miles indicates how closely the stations of which the means have been computed must have been situated.

The map occupies about 150 square inches, and there are portions where the work is so fine that it would take a week to verify one square inch; therefore we can only speak generally, and that we are glad to do very favourably. We believe it to be the best general map of the rainfall of Western Europe yet issued. There is only one fact which strikes us as improbable, viz.—that very often the isohyetal lines (lines of equal mean rainfall) cross the rivers at approximately right angles; considering that a river is at the bottom of a valley, the effect of elevation would generally tend to make the lines parallel with the rivers rather than perpendicular to them. But, as we have already intimated, it is impossible until the whole of the details are published, to say more than that M. Angot has evidently taken extreme care, and produced a very valuable map. The accompanying text is, of course, accurate, and, besides that, it is pleasantly written, and explains the principal features of the distribution of rain in Western Europe both as regards quantity and seasonal distribution.

We anticipate with pleasure the appearance of the other sections of this great work.

Terrestrial Magnetism: *An International Quarterly Journal.* Published under the auspices of the Ryerson Physical Laboratory, A. A. Michelson, Director; edited by L. A. BAUER, with the co-operation of the following Associates:—C. Abbe, P. Baracchi, W. von Bezold, E. Biese, F. H. Bigelow, C. Börgen, C. Chistoni, W. Doberck, M. Eschenhagen, J. Hann, G. Hellmann, S. C. Hepites, D. A. Goldhammer, A. Lancaster, C. Lagrange, S. Lemström, G. W. Littlehales, J. Liznar, T. C. Mendenhall, T. Moureaux, F. E. Nipher, L. Palazzo, van Rijckevorsel, A. W. Rücker, E. Schering, A. Schmidt (*Gotha*), C. A. Schott, A. Schuster, M. Snellen, E. Solander, I. P. van der Stok, R. F. Stupart, A. de. Tillo, H. Wild. Chicago: The University of Chicago Press. Royal 8vo., 54 pp., plate.

AND so the pole to which all literature on Terrestrial Magnetism is to flow is fixed in Chicago. We have adopted the unusual practice of setting out in full the title page of the new journal, because the title-page is itself as unprecedented as is the publication: never before was such a galaxy of names on the title-page of any periodical, never was the word International more fully deserved. We may further remark that such a journal was very much wanted, and that in the interest of scientific progress we sincerely hope that it may have a long and prosperous career; our only doubt is whether there are in the world enough persons interested in the subject, and capable of following the papers, to make the circulation a financial success We know that some Americans do not hesitate to carry on publications even if they lose money by every number that they issue; we hope that *Terrestrial Magnetism* will be a financial as well as a scientific success; but if not, we hope that some of the rich citizens of Chicago will see to it that Dr. Bauer's spirited attempt does not fail for lack of financial support. Probably the loss, if any, will be borne by the Ryerson Physical Laboratory.

The journal will be in every respect international, even as far as language is concerned, for the prospectus states that though preferably one of the main languages should be used, yet any language which can be printed with Roman characters will be admitted, and in this number the first paper is English (by Dr. Schuster, F.R.S., of Manchester), the second German (by Dr. Schmidt, of Gotha), and the third English (by the Editor). The latter part is mostly English.

The printing and paper are exquisite, and there is an excellent reproduction of the very rare and probably earliest Equal Variation Chart of (?) 1701. Under the head of "Notes," we have a series of very interesting brief notices of nearly all that has occurred of importance in connection with Terrestrial Magnetism during the last six months. All advanced students of the subject must make themselves masters of the papers in this journal, and we trust that there is before it a very long and useful career.

Weather and Disease: *a curve history of their variations in recent years*, by ALEX. B. MACDOWALL, M.A., F.R.Met.Soc. Graphotone Co., London, 1895. Sm. quarto, 82 pages and many diagrams.

MR. MACDOWALL is, quite rightly, a strong advocate for presenting statistics in the form of curves. This is an excellent method, and frequently similarities of the form of curves suggest relations between facts, which relations might otherwise have passed unnoticed. With the object of this work we are in hearty sympathy. The author takes 20 features of weather, makes curves to indicate their intensity and chronological sequence, and he does the same for 16 varieties of disease. We quote four of each as typical:—

WEATHER.	DISEASE.
8 A long wave of temperature	5 Enteric or Typhoid Fever
9 A remarkable winter (1890-1)	6 Diarrhœa and Dysentery
10 The summers of this century	7 Small-pox since 1838
11 Spells of heat and their progression	8 Two centuries of Small-pox.

The book as a whole is very suggestive, but it is more like the reproduction in facsimile of the author's note-book than a published work; the horizontal lines in the diagrams seem to represent the actual lines on the squared paper used by the author, rather than the principal figures of the diagram, and frequently one is puzzled to know what certain figures mean—*e.g.*, on p. 58, referring to scarlet fever, the author says, "The dotted curve reaches wave crests every 4—7 years"; we first read this as implying from 4 to 7 years, but the crests to which he attaches dates are—

	1839	1844	1848	1854	1858	1863	1870	1875	1880
Interval...		4	3	5	3	4	6	4	4

and the mean of these is 4·1.* Again, on p. 61 we were puzzled as to curve *b*, of which no explanation is given except vaguely in the words, "Method as in 1 and 2," so we suppose that it is the enteric fever curve for England and Wales; lastly, on p. 75, "2.'77" indicates the second quarter of the year 1877, but everyone would not recognize that at first.

The author seems to us to love work, and the making of curves, but to do so somewhat in the vague hope that some unexpected relation may turn up. Happily, he is absolutely impartial, of which we will quote an instance. Division 3 of Meteorology is headed, "The best ten days in Summer"; it contains the result of tabulating for every day during June, July, and August for 45 years (therefore 4,140 entries), whether or not rain was measured at Greenwich,

* Perhaps Mr. MacDowall reckons the interval between 1839 and 1844 as 5 years, and so for all the others, this would give the mean of 5·1; but then we should have 4 for the minimum and 7 for the maximum, so that our first interpretation may be the correct one.

taking the mean for each date and subsequently Bloxamizing the curve with averages of 10 days. The result is general irregularity, but a very marked absence of days of rain between June 23rd and July 3rd, and yet the author says (perhaps rightly), "It need hardly be said, however, that no one who is 'weather wise' would build immoderate hopes on this or any other part of summer!" But if, when you have got out a striking result, you are not to build upon it, why take the trouble of getting it out?

TWO REMARKABLE TELEGRAMS.

WE are rather inclined to regard telegrams with suspicion. Two have, however, been published within the last few days, which, if true, are so important that, subject to the above caution, we epitomize their statements.

EXPLOSION OF A METEORITE OVER MADRID.

Reuter's Agency reported from Madrid that on Monday, February 10th, at 9.29 a.m., a vivid glare of blinding light was followed in 1½ minutes by a loud report, the concussion being such as not merely to create a panic, but to break many windows, and in some cases to shake down partitions. The sky was clear, and the sun shining brightly, when a white cloud, bordered with red, was seen rushing from S.W. to N.E., leaving behind it a train of fine white dust. A red tinted cloud was long visible in the E.

If all the statements are correct, we should infer that the meteor was of exceptional magnitude, probably weighing from 100 to 300 lbs., and that it burst within about 15 miles of Madrid, but very probably at a considerable altitude above the soil.

We notice that Reuter's Agency call it an "aerolite." We thought that an aerolite differed from a meteor or meteorite in that the former was chiefly stone, the latter chiefly iron and nickel; but on turning to a dictionary we find no distinction drawn between the two; and worse still, on looking into the best English book upon the subject, Dr. Flight's *Chapter in the history of Meteorites*, we find the two words used indiscriminately.

REACHING THE NORTH POLE.

Some years since Dr. Nansen achieved great distinction by crossing Greenland. In 1893 he started with five years' provisions and the full intention of reaching the North Pole. A telegram has arrived from Irkutsk, in Siberia, stating that he has reached the Pole, found land in the neighbourhood, and is returning. All honour to the "Hardy Norseman" if he really has succeeded.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, SEPTEMBER, 1895.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	82·8	24	42·6	22	73·7	51·5	53·7	86	121·3	33·5	1·28	2	2·6
Malta	90·1	13	57·7	1	84·0	67·3	64·2	70	144·5	56·8	·13	1	2·3
Mauritius	78·4	21	59·7	3	76·4	64·7	60·9	76	126·4	49·6	·83	15	5·6
Calcutta	92·4	15*a*	74·2	28	89·3	78·7	76·8	80	159·5	73·1	4·03	10	6·3
Bombay	88·1	28	71·2	8	83·8	76·1	75·0	85	140·9	70·0	11·91	21	7·7
Ceylon, Colombo	88·4	2	74·0	29	87·1	77·6	71·9	75	156·0	70·0	4·09	23	6·7
Melbourne	...	...	...	...	...	...	...	..	...	...	...	...	...
Adelaide	79·8	2	38·9	18	66·3	48·2	45·3	64	140·5	32·4	1·41	14	5·1
Sydney	83·8	9	43·9	23	68·1	51·8	57·0	62	133·0	31·1	3·64	12	3·3
Wellington	65·0	22	37·0	2	57·8	46·7	..	...	128·0	26·0	2·98	12	4·9
Auckland	66·0	10*b*	42·0	2	61·2	48·9	45·8	71	127·0	39·0	5·21	19	5·4
Jamaica, Kingston	93·3	19	71·2	8	89·3	74·1	70·8	80	...	...	1·78	6	4·4
Trinidad	93·0	13	68·0	13	88·7	72·0	72·1	76	172·0	67·0	5·69	15	. .
Grenada	86·4	4	72·6	30	83·8	75·4	71·4	76	156·8	...	11·83	21	4·1
Toronto	93·1	11	36·3	...	70·8	50·5	51·7	75	103·0	30·4	2·45	13	4·5
New Brunswick, Fredericton	...	...	...	...	...	...	...	...	...	...	...	...	...
Manitoba, Winnipeg	82·3	1	23·0	30	64·8	39·0	...	...	...	...	1·14	15	6·0
British Columbia, Esquimalt	67·3	28	35·1	21	60·4	45·2	48·9	84	...	...	1·29	21	6·9

a—and 24; *b*—and 17.

REMARKS.

MALTA.—Adopted mean temp. 74°·6, 0°·7 below the average. Mean hourly velocity of wind 5·8 miles. Mean temp. of sea 78°·6. Thunderstorm on 18th. Lightning on 6 days. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·1 above, of dew point 1°·0 above, and rainfall ·60 in. below, their respective averages. Mean hourly velocity of wind 10·7 miles, or 1·3 miles below average; extremes, 23·3 on 1st, and 1·7 on 3rd; prevailing direction, E.S.E. C. MELDRUM, F.R.S.

Adelaide.—Mean temperature 0°·1 above, rainfall ·39 in. below, the average of 38 years. C. TODD, F.R.S.

Sydney.—Mean temperature 1°·2 above, humidity 9 below, and rainfall ·41 in. above, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Showers at intervals in the early part of the month with strong N.W. winds; fine during the middle, with moderate N.W. winds; from the 20th to the end of the month showery, but at times very fine and pleasant. Thunder on 10th, 21st and 23rd. Slight earthquake on 13th. Mean temp. 1°·3 above, and rainfall 1·28 in. below, the average. R. B. GORE.

Auckland.—The early portion of the month was showery, but warm and genial; the middle of the month dry and unusually warm. From the 21st to the close wet and stormy, with occasional thunderstorms. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 7·3 miles. Rainfall two-fifths of the average. Slight shock of earthquake on 30th. R. JOHNSTONE.

TRINIDAD.—Rainfall 1·84 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, JANUARY, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	·84	XI.	Lake Vyrnwy	2·02
,,	Birchington, Thor	·84	,,	Corwen, Rhug	1·53
,,	Hailsham	1·15	,,	Carnarvon, Cocksidia ...	2·48
,,	Ryde, Thornbrough	·99	,,	I. of Man, Douglas	2·49
,,	Emsworth, Redlands ...	1·15	XII.	Stoneykirk, Ardwell Ho.	2 44
,,	Alton, Ashdell	1·31	,,	New Galloway, Glenlee	3·80
III.	Oxford, Magdalen Col..	·60	,,	Lilliesleaf, Riddell	1·25
,,	Banbury, Bloxham	·82	XIII.	N. Esk Res. [Penicuick]	1·10
,,	Northampton, Sedgebrook	1·31	,,	Edinburgh, Blacket Pl..	·84
,,	Alconbury	·99	XIV.	Glasgow, Queen's Park..	1·54
,,	Wisbech, Bank House...	1·16	XV.	Inverary, Newtown	5·56
IV.	Southend	·79	,,	Oban, The Corran	...
,,	Harlow, Sheering..... ...	·84	,,	Islay, Gruinart Schools..	3·29
,,	Colchester, Lexden	1·04	XVI.	Dollar.....	2·35
,,	Rendlesham Hall	1·24	,,	Balquhidder, Stronvar...	4·82
,,	Diss	...	,,	Ballinluig	1·36
,,	Swaffham	1·54	,,	Dalnaspidal H.R.S.....	4·93
V.	Salisbury, Alderbury ...	·94	XVII.	Keith H.R.S.....	1·32
,,	Bishop's Cannings	·87	,,	Forres H.R.S.	1·28
,,	Blandford, Whatcombe .	1·34	XVIII.	Fearn, Lower Pitkerrie..	...
,,	Ashburton, Holne Vic...	1·69	,,	N. Uist, Loch Maddy ...	5·41
,,	Okehampton, Oaklands.	1·55	,,	Invergarry.....	6·02
,,	Hartland Abbey	1·34	,,	Aviemore H.R.S.	2·31
,,	Lynmouth, Glenthorne.	·61	,,	Loch Ness, Drumnadrochit	3·05
,,	Probus, Lamellyn	1·42	XIX.	Invershin	1·64
,,	Wellington, The Avenue	·69	,,	Scourie	6·93
,,	Wincanton, Stowell Rec.	1·12	,,	Watten H.R.S.....	1·65
VI.	Clifton, Pembroke Road	·60	XX.	Dunmanway, Coolkelure	3·47
,,	Ross, The Graig	·37	,,	Cork, Wellesley Terrace	1·11
,,	Wem, Clive Vicarage ...	·84	,,	Killarney, Woodlawn ...	2 78
,,	Cheadle, The Heath Ho.	1·40	,,	Caher, Duneske	·89
,,	Worcester, Diglis Lock	·44	,,	Ballingarry, Hazelfort...	1·23
,,	Coventry, Coundon	1·33	,,	Limerick, Kilcornan ...	1·35
VII.	Ketton Hall [Stamford]	·77	,,	Ennis.....	...
,,	Grantham, Stainby	1·04	,,	Miltown Malbay	2·51
,,	Horncastle, Bucknall ...	1·01	XXI.	Gorey, Courtown House	1·02
,,	Worksop, Hodsck Priory	·69	,,	Athlone, Twyford	1·86
VIII.	Neston, Hinderton	1·26	,,	Mullingar, Belvedere ...	1·69
,,	Southport, Hesketh Park	·83	,,	Lougford, Currygraue...	2·04
,,	Broughton-in-Furness ...	4·56	XXII.	Woodlawn	2·77
IX.	Ripon, Mickley.....	·64	,,	Crossmolina, Enniscoe ..	2·74
,,	Melmerby, Baldersby ...	·51	,,	Collooney, Markree Obs.	1·92
,,	Scarborough, Obs.	·86	,,	Ballinamore, Lawderdale	2·78
,,	Middleton, Mickleton ...	1·82	XXIII.	Lough Sheelin, Arley...	1·95
X.	Haltwhistle, Unthank...	1·95	,,	Warrenpoint.....	1·94
,,	Bamburgh	1·32	,,	Seaforde..	1·67
,,	Keswick, The Bank.....	3·20	,,	Belfast, Springfield	2·30
XI.	Llanfrechfa Grange	1·03	,,	Bushmills, Dundarave..	2·24
,,	Llandovery	2·20	,,	Stewartstown	1·55
,,	Castle Malgwyn	1·90	,,	Killybegs	4·29
,,	Builth, Abergwesyn Vic.	3·61	,,	Lough Swilly, Carrablagh	2·72
,,	Rhayader, Nantgwillt...	2·75			

JANUARY, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Depth	Greatest Fall in 24 hours. Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·78	— ·84	·22	25	9	52·7	17	28·0	20	8	13
II.		Maidstone (Hunton Court)...	·90	— ·65	·34	12	3	...	...	...	...	...	...
,,		Strathfield Turgiss	·45	— 1·36	·08	24*a*	10	53·7	17	22·2	20	10	14
III.		Hitchin	·70	— ·84	·24	24	11	51·0	2, 25	23·0	22	13	...
,,		Winslow (Addington)	1·14	— ·67	·33	24	12	52·0	15*a*	23·0	20	9	16
IV.		Bury St. Edmunds (Westley)	1·51	+ ·04	·44	24	8	52·0	2	25·0	23	...	...
,,		Norwich (Brundall)	1·01	...	·30	13	16	52·0	2	24·8	21	9	17
V.		Weymouth(LangtonHerring)	1·09	— 1·25	·26	24	12	53·0	25	29·0	10	7	...
,,		Torquay (Cary Green)	·64	...	·17	24	12	53·8	26	31·0	7	2	12
,,		Polapit Tamar [Launceston]..	1·11	— 1·91	·31	13	16	54·7	1	22·8	6	9	13
VI.		Stroud (Upfield)	·50	— 1·70	·15	24	10	51·0	26	27·0	21	12	...
,,		ChurchStretton(Woolstaston)	1·00	— 1·16	·25	15	14	52·5	2	24·0	21*d*	9	20
,,		Tenbury (Orleton)	·63	— 1·51	·22	24	8	54·4	17	23·5	21	8	13
VII.		Leicester (Barkby)	1·04	— ·72	·26	24	11	53·0	2	17·0	22	16	22
,,		Boston	·96	— ·43	·21	25	11	50·0	25	27·0	20	11	...
,,		Hesley Hall [Tickhill].....	·47	— 1·30	·10	10	12	54·0	2	25·0	21	10	...
VIII.		Manchester(PlymouthGrove)	·75	— 1·71	·21	14	10	53·0	2	27·0	20	6	9
IX.		Wetherby (Ribston Hall) ..	·12	— 1·77	·05	14	3	...	...	...	...	...	...
,,		Skipton (Arncliffe)	4·44	— 1·20	1·48	24	19	..	...	...	...	...	...
,,		Hull (Pearson Park).	·75	— 1·02	·21	13	10	53·0	2	25·0	23*e*	13	17
X.		Newcastle (Town Moor)	1·36	— ·45	·32	26	13	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	10·90	— 1·28	2·20	24	15	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·25	— 2·04	·56	24	11	...	...	...	...	...	...
,,		Haverfordwest	1·87	— 2·55	·69	24	17	52·6	2	26·0	21	5	15
,,		Aberystwith (Gogerddan) ...	2·71	— ·82	1·00	24	12	53·0	1	...	..	...	...
,,		Llandudno.....	1·20	— 1·08	·35	14	9	55·5	2	31·0	23	...	...
XII.	SCOTLAND.	Cargen [Dumfries]	2·11	— 1·66	·56	1	12	50·4	17*b*	21·2	23	9	..
,,		Jedburgh (Sunnyside).....	·90	— ·82	·25	15	11	52·0	27	17·0	23	13	...
XIV.		Colmonell	2·75	...	·60	15	13	57·0	27	22·0	9, 22	10	...
XV.		Lochgilphead (Kilmory).....	4·09	— 2·05	·71	26	21	...	...	23·0	22	8	...
,,		Mull (Quinish).....	3·79	— 1·88	·61	26	20	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·70	— 1·20	·50	15	9	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	·80	— 1·17	·20	14	14	53·0	17	22·0	23	11	...
XVII.		Braemar	1·86	— ·83	·60	27	14	47·3	17	18·2	23	18	26
,,		Aberdeen (Cranford)	·60	...	·12	15	13	52·0	17	28·0	9*f*	21	..
XVIII		Strathconan [Beauly]	6·00	+ 1·12	1·00	15	16	...	...	...	...	...	...
,,		Glencarron Lodge.....	10·41	...	1·34	16	23	55·4	27	22·9	9	15	...
,,		Cawdor [Nairn]	1·54	— ·63	·36	14	14	...	...	...	...	...	...
XIX.		Dunrobin	2·97	+ ·51	·53	14	14	55·0	18	28·5	9	9	...
,,		S. Ronaldsay (Roeberry).....	2·91	— ·04	·55	18	23	48·0	16*c*	26·0	14	6	...
XX.	IRELAND.	Darrynane Abbey.....	2·15	...	·71	24	16	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	1·20	— 2·36	·42	24	11	55·0	17	26·0	21	4	...
,,		O'Briensbridge (Ross)	1·38	...	·42	24	12	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	·86	— 2·04	·20	24	11	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	·72	— 1·14	·21	13	14	56·8	2	27·9	21	3	8
XXII.		Ballinasloe	1·59	— 1·49	·40	1	20	54·0	2	21·0	10	9	...
,,		Clifden (Kylemore)	4·45	...	·85	23	16	...	...	...	...	...	...
XXIII		Waringstown	1·99	— ·66	·40	14	14	53·0	1, 2	25·0	9*g*	11	13
,,		Londonderry (Creggan Res.).	2·69	— ·73	·71	14	17	...	...	...	...	...	...
,,		Omagh (Edenfel).....	1·79	— 1·23	·47	14	14	52·0	26	23·0	9	7	14

+Shows that the fall was above the average ; —that it was below it.

a—and 25. *b*—and 18, 27. *c*—and 17, 27. *d*—and 22. *e*—and 24. *f*—and 14, 21. *g*—and 19, 20, 22.

METEOROLOGICAL NOTES ON JANUARY, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—The weather at first was dull and gloomy, but dry and settled until the 10th, when slight S fell, followed by light rains. The month generally was dry and very mild. Wren's nest with two eggs found on 18th; female flowers of hazel on 28th.

ADDINGTON.—A mild open month, with very little sunshine. The principal feature was the extremely high barometric pressure on the 9th and 10th, and again on the 30th. Buds on some trees getting very forward at the close.

BURY ST. EDMUNDS, WESTLEY.—A fine open month, with very little frost. Remarkable for the very high bar. of the 10th and 30th; S on 10th.

NORWICH, BRUNDALL.—A dry and mild month, with much haze and mist at times. No S all the month, and little frost, but the mean temp. was 1°·5 lower than in 1890. On the 9th the bar. (corrected and reduced) stood at 30·900 in.

WEYMOUTH, LANGTON HERRING.—The mean temp. at 9 a.m., 40°·9, is 2°·2 above the average of 24 years. The month was mild, and notwithstanding the very high bar. there was much damp weather. The readings of the bar. on the 9th and 10th were the highest since the register commenced, but were exceeded by ·01 in. on the 30th and 31st. Fogs on 1st, 18th, 25th, and 27th.

TORQUAY, CARY GREEN.—Rainfall 2·73 in. below the average. Mean temp. 43°·6, or 1°·9 above the average. Duration of sunshine 43 hours 40 minutes, being 27 hours 10 minutes below the average; 16 sunless days.

POLAPIT TAMAR [LAUNCESTON].—Though the atmosphere was generally very humid, the rainfall was very small. The month's rainfall is exactly the same as that of January, 1881, and the smallest in January since then. The mean of the max. and min. shade temperatures for the month is 41°·9. There were no storms, S, or H, and very little frost throughout. The bar. was remarkably high on the 9th, 10th, 29th, 30th and 31st. Thick fogs on 6th, 19th and 30th.

STROUD, UPFIELD.—S fell on 10th at 8 p.m.; gale in afternoon from N.W. on 15th.

WOOLSTASTON.—A beautiful open winter month, with frosts on the ground most nights. Mean temp. 39°·2.

TENBURY, ORLETON.—A warm dry month, with a mean temp. more than 3° above the average of 35 years. During the last 60 years there have been only four months of January with less R. Very little sun during the month, and for the first eight days the sun was never seen at all. S on 23rd; fog on many days.

LEICESTER, BARKBY.—A rather cloudy, but fine open month, with little R. High bar. readings in the first and last weeks. Mean temp. 38°·2.

MANCHESTER, PLYMOUTH GROVE.—Thick fog on 6th and 7th; dense fog on 8th, 12th, and 20th. Slight fall of S and sleet on 10th. Quite spring weather on 18th and 19th. Mean temp. 40°·5.

WALES.

HAVERFORDWEST.—The general character of the month was damp with a small rainfall; the smallest excepting January, 1855 (in which month only ·56 in. fell) in 47 years. From the 6th to the 12th low temp. prevailed, and again from 18th to 23rd it was very cold, but mostly overcast. The weather of the whole month was dull and cheerless and excessively damp. Remarkably high bar. readings occurred at 9 p.m. on 9th (30·984 in.), and 9 p.m. on 30th (30·927 in.)

ABERYSTWITH, GOGERDDAN.—A very quiet sunless month, with very high bar. readings.

SCOTLAND.

CARGEN [DUMFRIES].—The feature of the month was the high bar. pressure. The mean, 30°·151 in., has been several times exceeded, but the reading on the 9th, 30°·928 in., has never previously been reached since observations commenced in 1860, the nearest approach being 30°·838 in. on 18th January, 1882. Extraordinary high pressure was recorded during the seven days 5th to 11th inclusive and during the last three days of the month. Between the 11th and 15th the bar. fell 1·63 in., and on the 15th a pretty severe westerly gale occurred. The mean temp. of the month is 2°·7 above the average, and has only five times been exceeded in 37 years, the highest mean temp. being 43°·1 in January, 1882. Rainfall is much below the average, and except on the 1st was of a very light nature. Sunshine was again conspicuous by its absence, dull foggy weather prevailing during the month. Pastures were wonderfully fresh and green, an appreciable boon in the face of bare stackyards and a rapidly diminishing store of roots.

JEDBURGH.—The temp. generally was high, especially during the day. The wind mostly S.W. and W. The rainfall has been less in only five Januaries during 32 years. Outdoor work never suspended and farm work far advanced. Birds mating. Bar. very high from 4th to 13th. S 3 inches deep on 14th. Snowdrops in bloom on 22nd, yellow aconite in bloom on 24th.

COLMONELL.—Rainfall 2·04 in. below the average of 20 years.

MULL, QUINISH.—Excepting from 15th to 19th, the month was exceptionally fine and mild. Temp. at 9 a.m. on 27th, 50°.

ABERDEEN, CRANFORD.—A very dry month all through.

S. RONALDSAY, ROEBERRY.—A fairly good month upon the whole. Bar. on 9th the highest recorded for 25 years. Mean temp. (39°·6) 1°·9 above the average.

IRELAND.

DARRYNANE ABBEY.—A very fine and remarkably mild month with very high bar. Slight frost on ground on 21st and 22nd. Fuchsias coming into leaf, and crocuses and daffodils in flower, at the close.

O'BRIEN'S BRIDGE, ROSS.—Mild open weather up to 12th, with remarkably high bar. and wind light from N. to N.E. Slight frosts from 18th to 22nd and frosty and bright at the close.

DUBLIN.—January proved very mild, often dull and damp with frequent, but scanty, rainfall. S on only one day and no H. It afforded a complete contrast in every particular to the severe January of 1895, and will be especially memorable for the record breaking readings of the bar. on the 9th (31·020 in. at 10 a.m.). The mean temp., 44°·3, is 2°·9 above the average. Lunar haloes were seen on the 19th and 24th. The atmosphere was foggy on 9 days. High winds occurred on 9 days, reaching the force of a gale on 2 days.

WARINGSTOWN.—At 3 p.m. on 9th the bar. (cor. and red.) stood at 31·059 in., a point never before reached here.

OMAGH, EDENFEL.—It is only by usage that the January just past can be called a winter month, as there was not a wintry day in it. The ground was not once white with S, and hardly once with hoar frost. With a rainfall below, a temp. above, the average and two anticyclonic periods of extraordinary intensity, the month altogether was more of an early autumnal than a winter character.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXII.] MARCH, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

EXTREME HEAT IN AUSTRALIA IN JANUARY, 1896.

THE Australians have had a very hot January, and in some parts hot beyond all precedent. We therefore give not merely the details, which Mr. H. C. Russell, F.R.S., has been so kind as to send from Sydney, but also a selection of notes and articles from various issues of the Melbourne *Argus*. It would, of course, be presumptuous for us to pretend to compile a record of the phenomena at our antipodes; but seeing the exceptional character of January and February in the British Isles, and the severity of the winter in parts of North America, we think that some popular notes of Australian weather at the same time may be interesting.

To the Editor of the Meteorological Magazine.

SIR,—I send the enclosed readings of the thermometers on our record day. I felt what was coming when I rose in the morning, and determined to follow the temperature by frequent readings. Both the thermometers are first-class; the Standard has a Kew certificate of + 0·1 at 72°, 82°, and 92°; of + 0·2 at 102°, ; and 112°, and the max. a certificate of no error from 32° to 92°. I have not applied the correction to the Standard; had I done so, the Standard readings at 1.20 p.m. would have agreed with the max., and at 2 p.m. have been 108°·7; but when the temperature is oscillating as it was at the top of the heat wave, I do not expect to get the temperature to a tenth of a degree. The cause of the heat was a hot land wind.

We are having a very hot summer. We have already had 95°·2 on 4th, 105°·2 on 6th, 98°·5 on 10th, 100°·0 on 11th, 108°·5 on 13th, and 99°·0 on 18th. I send you my pamphlet about icebergs. Those who hold that icebergs cool the weather will have a nut to crack with the icebergs on one hand, and these excessive heats on the other.—Yours faithfully,

H. C. RUSSELL.

Sydney Observatory, January 20th, 1896.

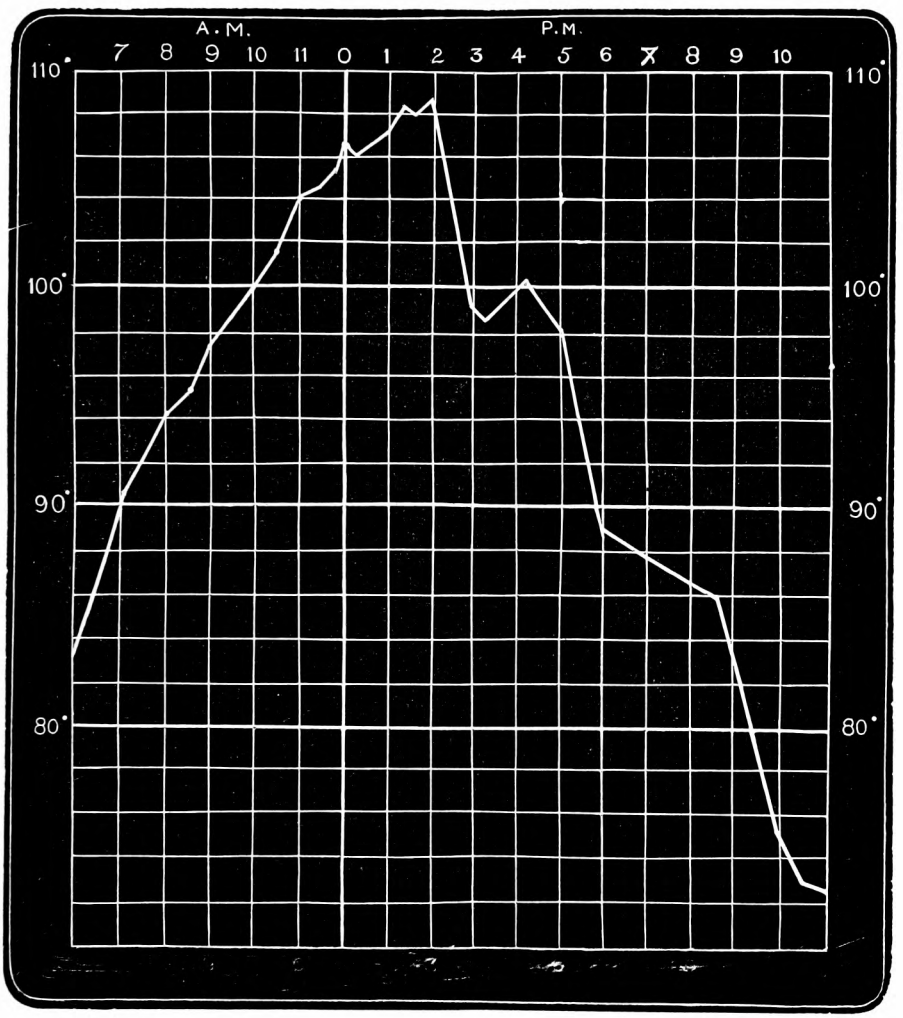
Shade Temperatures at Sydney, January 13th, 1896.

Time.	A Kew Standard Thermometer.	First Class Max. Kew Certificate.	
	°	°	
6.0 a.m.	83·6		Temps. at 6, 7, and 8 taken from thermograph.
7.0 ,, ...	90·7		
8.0 ,, ...	94·3		
8.30 ,, ...	95·6	95·7	
9.0 ,, ...	97·7	97·6	
9.30 ,, ...	99·0	99·0	
10.0 ,, ...	100·0	100·0	
10.15 ,, ...	101·0	101·1	
10.30 ,, ...	101·9	101·9	
11.0 ,, ...	104·0	104·0	
11.15 ,, ...	104·2	104·4	
11.30 ,, ...	104·9	105·5	
11.45 ,, ...	105·4	105·7	
Noon	106·5	106·2	
0.3 p.m.	106·4	106·6	
0.15 ,, ...	106·2	106·9	
0.22 ,, ...	106·7	106·9	Humidity 25 by Indian Tables.
0.30 ,, ...	106.9	106·9	,, 26 ,, ,,
0.45 ,, ...	107·0	107·2	
0.55 ,, ...	107·0	107·4	,, 26 ,, ,,
1.10 ,, ...	108·0	108·2	,, 26 ,, ,,
1.20 ,, ...	108·3	108·5	
1.30 ,, ...	108·0	108·5	
1.45 ,, ...	108·2	108·5	
2.0 ,, ...	108·5	108·5	,, 22 ,, ,,
3.0 ,, ...	98·9	108·5	At 2.30 p.m. the fresh N.W. wind had died out and a light sea breeze came in.
3.15 ,, ...	98·5	108·5	
4.18 ,, ...	100·1	108·4	
5.0 ,, ...	98·0	108·3	Contraction of mercury.
6.0 ,, ...	88·7	108·2	
8.40 ,, ...	86·0	...	Wind changed to Southerly Burster at 9.30 p.m.
10.0 ,, ...	75·3	...	
10.30 ,, ...	72·8	...	
11.45 ,, ...	72·0	...	

This is the Sydney record day, the greatest heat ever known, certainly since 1859. Our record before was in January, 1863, 106° 9, when it rose quickly, *i.e.*, in 3 hours, and the sudden advent at 1 p.m. of a violent Southerly Burster cooled down the air 22° in 15 minutes. Our present record is remarkable not only for its heat but for its persistence.

In taking the readings I observed that if I happened to go when the temperature was rising, the thermometers agreed.

Shade Temperature at Sydney, N.S.W., January 13th, 1896.



A HOT DAY IN MELBOURNE.

108 DEG. IN THE SHADE.

It will hardly surprise those who had business in the city yesterday (January 23rd) to learn that the day was the hottest we have had for several years, though not, as many ventured to prophesy, the hottest on record. Three times during the many years that heat records have been kept in the Melbourne Observatory the temperature of yesterday was exceeded. The highest register was in January, 1862, when the shade temperature reached 111°·2. In 1876, 110°·7 was registered, and 110°·5 in the summer of 1882. With one exception, therefore, it will be seen yesterday, with a record in the shade of

108 deg., was the hottest day we have had in Melbourne for 20 years—a record quite sufficient to cause it to be remembered. The excessive heat was largely due to the burning north-west wind blowing, and although many casual weather prophets had declared that some of the excessive heat of Riverina might be expected here, they were correct in their prophecy only by the purest chance. The Western Riverina heat cannot, save under exceptional conditions, affect us, and yesterday's record was purely a local achievement—happily with sound local characteristics, too, inasmuch as a cool wind came suddenly up from the south at about 5 o'clock, and in about 10 minutes the thermometer fell 20 degrees. The change was the more agreeable inasmuch as it was totally unexpected, no electric couriers having announced its coming at the Observatory. Ten minutes before it came the best that Mr. Baracchi could promise from the chart was a change within 24 hours. This cool burst came from off the west Tasmanian coast, and thus none of the Observatory outposts were able to announce its coming until it was absolutely here. The first sign of it in the city was a dense cloud of dust, and Melbourne, as seen from the outlook at the Observatory, was then a remarkable sight.

The excessive heat now experienced in New South Wales is largely due to the dry state of the country, for when there is little moisture in the air or soil such high records are to be expected. For the last few months our local rainfall in the south of Victoria has been up to the average, and the excessive heat in Melbourne yesterday is attributable almost entirely to the dry hot wind blowing. As showing the effect of moisture on the temperature, it is worth pointing out that at Port Darwin the temperature rarely exceeds 95°, owing to the moisture in earth and air, and the heat in these northern areas is the more trying solely because it remains pretty well the same night and day. Rarely is a sudden change with thunder and cooling showers such as followed yesterday's heat in Melbourne experienced in Western Riverina, so that those who judge the heat privations of that part of the country from what was experienced in Melbourne yesterday altogether underrate the sufferings of the people across the Murray.

THE HEAT IN THE COUNTRY.

The heat was very general throughout the colony, as the following advices from our correspondents, giving the record of the shade temperature at the different places, will show:—

All in Victoria.

Ararat, 99; Avenel, 108.
Ballarat, 102·5; Bendigo, 110; Bridgewater, 112.
Castlemaine, 104; Charlton, 110; Cobram, 107.
Donald, 112; Dunolly, 106; Drouin, 100.
Euroa, 104; Echuca, 112.
Frankston, 108.
Geelong, 110; Gisborne, 108.
Hopetoun, 113; Horsham, 112.
Kerang, 110; Kilmore, 105.
Minyip, 110; Macedon Upper, 101; Mildura, 120; Murchison, 109·5.
Nagambie, 110; Natimuk, 115.
Pakenham, 108.
Rupanyup, 114.
Swan Hill, 116; St. James, 110; St. Arnaud, 110; Somerville, 104.
Tatura, 110; Tallarook, 106; Traralgon, 104.
Wedderburn, 113; Wangaratta, 109.
Yarrawonga, 112.

The flame-like sunshine—beneath which, over wide spaces of Australian soil, the grass is just now being turned into dust and the rivers into vapour—is not the most scorching element in the weather about which we are all grumbling. According to Mr. Russell, the Government Astronomer of New South Wales, the action of the sun is turning the waterless plains of the interior into the breeding ground of heat waves, which, with the breath of a thousand furnaces, come romping over cities and plains until the whole continent faints and droops under their white-hot ardours.

The heat wave has been sufficiently scorching in Victoria, but it has reached its highest intensity in New South Wales. The lamenting journals of that colony, for example, betake themselves to mediæval Latin to describe the horrors of a given day, a true *dies iræ!* On that day, indeed, the mercury in the thermometer only registered 108°, and there are traditions that on a yet more dreadful day in 1854, Sydney thermometers registered 113°. But Sydney heat has a most clinging and vaporous quality, under which the figures of the thermometer are helplessly inadequate as a measure of human discomfort. But even at 108° the bank of superheated steam drifted over the city roofs and out to sea, and 150 miles from the coast the ships that ran into it describe the experience as running into "a bank of flame." The human imagination turns aside from the spectacle presented by, say, Bourke, Wilcannia, or Camden. At Bourke the thermometer, for a whole week, oscillated between 113° and 121°. At Wilcannia 119° was a familiar record, and the airless heat of the nights was, on the whole, more cruel than the scorching glare of the day. In Camden, unless thermometers can lie, the heat rose to 123°. At the present moment apparently the perspiring crowds are fleeing from Bourke as the inhabitants of Pompeii fled from that city when Vesuvius was pouring upon it its tempest of burning ashes. Not a few pastoral towns in western New South Wales, as a matter of fact, threaten to be abandoned by their scorched inhabitants, and no wonder, for the heat wave is as cruel and as deadly as an average pestilence. Twenty-two deaths were registered in Bourke in five days; five deaths at Wilcannia were registered in a single day; in Sydney the heat wave wave killed 125 persons in one week. Professor Stuart, it is true, with the cold composure of science, assures the panting inhabitants of Sydney that "damp, muggy, and cold weather" kill more people than the most fervent heat wave. But the people of New South Wales at the present moment would probably welcome the frozen fogs of the North-West Passage as an exchange for the heat, as of a fever ward, or of a gas furnace, which is killing the very mosquitoes in New South Wales gardens. It is certain that across the mortality tables of 1895 the heat wave will scribble statistics which might alarm even a committee of undertakers.

The critics who are always glad to discover some scandal about the Australian climate need not rejoice too triumphantly. New York, for example, which alternates between a blizzard and a sun-bath, has worse records than Bourke or Wilcannia. On a given day in 1892, when the mercury in New York thermometers oscillated between 99° and 102°, no fewer than 223 deaths from excessive heat were registered in twenty-four hours. That particular American heat wave killed 600 people in three days in New York alone! In the matter of heat waves the foreign article, it is clear, is more deadly than even our local variety!—"*Argus*," 24*th January*, 1896.

Bush Fires in Gippsland.

Mirboo North, Jan. 9th.—The weather is very sultry, and bush fires are surrounding the township. Great damage has been done in the Allambee district. Messrs. Euring, Barton, Smith, Davies, O'Shea, and others have suffered a loss of grass, fencing, and in other ways, and it was only with difficulty that the fire could be kept within bounds. The selectors are working determinedly to subdue the flames, but the fires are still raging in different parts.

Bendigo, 9th.—The thermometer registered 99 deg. in the shade to-day. Rain is now promising.

Boort, 9th.—The weather has been very close for the past few days, reaching the exceptionally high register to-day of 112 deg. in the shade. The lakes are rapidly drying up. A welcome change appears to be coming, as heavy clouds are rising in the north-east.

Foster, 9th.—No rain has fallen to stay the ravages of the bush fires, the result being that the town is enveloped in smoke. No fires are reported from Stony Creek proper, nor from Fish Creek. To-day is very warm and sultry, with not a breath of air stirring.

Hopetoun, 9th.—To-day was the hottest day of the season, the thermometer showing 109 deg. in the shade.

Mildura, 9th.—The heat to-day was very intense, a hot, scorching wind blowing. The thermometer registered 114 deg. in the shade. About 5 o'clock there was a blinding dust storm, accompanied by light thunder. There were a few spots of rain only, but more seems pending. This is the record of heat for this summer.

Macarthur, 9th.—The excessive heat continues, being almost a repetition of Sunday (5th). Bush fires continue burning, and to-day the fire has crossed from Werrangourt into Eumerala West and Knebsworth. Mr. Donald Cameron had a narrow escape from losing his dwelling-house. This evening the fire entered the Braes Estate, and the properties of Messrs. Brankie, Mills, Quirk and Christie are in imminent danger. Owing to the high wind little can be done to check the flames. Rain is badly needed, as the crops are suffering and the grass is parched.

The Weather in the Other Colonies.

Brisbane, Jan. 9th.—Splendid rain is falling throughout the agricultural portion of the Mackay district.

Broken Hill, 9th.—It was very warm locally to-day, 111 deg. being registered in the shade at midday. After 1 o'clock, however, it increased to 113 deg., being the record for the season. It was very dusty throughout the morning, and in the afternoon a whirlwind of a cyclonic character came from the west down Oxide Street. One or two small habitations were wrecked and a verandah was carried away, and sheets of iron were gyrating aloft in all directions. The damage, however, was not serious, and no accidents are recorded. It is cooler this evening, with a heavy bank of clouds.

"*Argus*," 10*th January*, 1896.

ADELAIDE.—Max. in shade 111°·2 on 23rd.

SEVERE FROST IN NORTH AMERICA.

The two following reports speak for themselves and show a remarkable contrast with the winter on this side of the Atlantic :—

"WINTER IN THE WEST.—It is interesting and rather disquieting to note that 'zero weather' of an unprecedently severe character is prevalent over New York and the Eastern States of America. In the Empire City, on Monday morning, Feb. 17th, the thermometer stood at nearly seven degrees below zero, showing, as the popular expression has it, 39 degrees of frost. This is said to beat the Meteorological Office's previous records, which extend over 28 years. During that period no reading so low has been registered so late in the month of February. New York, however, was torrid in comparison with its 'Hinterland.' In the interior of New York State readings of 20 and 30 below zero are said to have been common; while at Saranac, in the Adirondacks, a record of 49 degrees below zero was obtained. This truly Winnipeg reading, representing 81 degrees below freezing point, is supposed to be the lowest ever recorded in the Eastern States. The cold wave seems to have extended steadily over the Continent from the North-Westward, where they have been having a very cold winter. It is to be hoped that its progress in our direction will be stayed, since, with vegetation so far advanced as it is, and young plants full of moisture, anything resembling a severe frost would be a grievous calamity. Nevertheless, it is a familiar fact that we import most of our climate from America. The cold snap recently experienced, however, the nearest approach to winter we have had this year, came from a different quarter. It originated at the North Pole, and, oddly enough, arrived here simultaneously with the announcement that Dr. Nansen was returning from its birthplace."—*Newcastle Chronicle, February 20th.*

———

"SEVERE WINTER IN NEWFOUNDLAND.—The correspondent at St. John's of the Colonial Missionary Society, writing by the last mail, says :—'We are having a terrible winter here, perfect Arctic weather, worse than has been known for the past 40 years. Snow lies on the ground from 10 ft. to 15 ft. deep, country roads completely blocked, communication with the outposts almost entirely suspended owing to ice blockade. The suffering among the poorer classes is very great, especially in Fortune Bay, where the entire failure of the herring fishing has brought the people to the verge of starvation. We have done all we can in the way of relief, and I do not think there has been much actual suffering at our two stations; but the want in other destitute localities of the bay is said to be simply appalling.'" —*Times, March 3rd.*

THE INDEX TO THE METEOROLOGICAL MAGAZINE.

To judge by the number of replies we should certainly not proceed with the above, for we have received only 48, and

$$48 \times 2/6 = £6,$$

which, even if all the writing and preparing and editing were done gratuitously, would probably be less than a quarter of the cost.

But, on the other hand, the 48 requests that have come are from some of the highest authorities upon meteorology in nearly all parts of Europe. I should not think of letting a small pecuniary loss prevent my doing that which men of such eminence think desirable, and, therefore, I shall put the work in hand as soon as time permits.

I can at present form no definite idea as to the cost. The indices to the individual volumes make collectively about 90 pages, the general index will probably be considerably more—possibly 150 pages; and, if so, the cost, including paper and binding, may run up to £40 or so. But, as is always the case, friends are ready to help. One (I have not asked his permission, so I must not at present mention his name) has offered to assist in preparing the MS., and another has sent the following considerate letter:—

To the Editor of the Meteorological Magazine.

DEAR SIR,—As you ask for an expression of opinion with reference to a General Index for the magazine, I venture to say that I think there can be no question about its usefulness. As I am on the point of having the whole series bound I was, by a curious coincidence, only a few hours before I received the February number, debating whether I should have the "Title and Index" sheets of all the volumes bound up together in one Index Volume or not. If a complete Index for thirty years was issued it would solve that difficulty, and make it very easy to find any subject required.

I regret to see that you say it "won't pay." Might I suggest that if in the next number of the magazine you were to print an approximate estimate of the cost, there might be found some amongst your subscribers who would not only be willing to pay the half-crown for their own copy, but also to subscribe something in addition towards defraying the extra cost. At any rate I would be very willing to do so.

In concluding this letter, I trust I may, without presumption, be permitted to congratulate you on your long and successful career as Editor of this magazine, and to express a hope that you will be spared for many years to come to illustrate the cardinal doctrine of continuity which you have so persistently and successfully advocated in all matters pertaining to meteorology.—I am, yours sincerely,

CHARLES L. BROOK.

Harewood Lodge, Meltham. Feb 21st, 1896.

As already explained, no satisfactory estimate can be submitted

until the MS. is ready, but the sales ought to produce £15, and if so, the loss would probably be about £20 or £30. However, the first thing to be done is to put the work in hand, and if when the accounts come in there is a serious deficiency, I am quite sure that some of my correspondents will act upon Mr. Brook's suggestion, and come to the rescue.

Possibly some one may think that I ought to have known that few copies would be ordered, and to have made the price 5s., instead of 2s. 6d., and thereby diminished the probability of loss. I did consider that point, but I wanted the Index to be as widely useful as possible, both as regards its contents and its circulation. After every one has had the option of procuring a copy, it may be a question whether the price of any remaining in stock should not be doubled, or even quadrupled. They may become as scarce as the Indexes to our charming contemporary *Notes and Queries.*

G. J. SYMONS.

THE GREAT MADRID METEOR.

[We are glad to be able to supplement the notice in our February number by the following official report from the Director of the Observatory, which we have abridged, and annotated from the original which appeared in *Nature* of February 27th.—ED.].

ON Monday, February 10th, at 9h. 29m. 30s., there was observed an instantaneous bluish-white illumination in the atmosphere, so strong and vivid as to be visible in the inner rooms and in the open air.

The day was a magnificent one; blue sky, no wind, and a radiant sun.

Soon after there was plainly visible near the zenith, and some few degrees to the south-east, a white spot, like smoke, bearing north-east to south-west, of about 6° length and 1° wide; its form was semi-circular, with the convexity turned to the east. In the centre, and near the apex of the curve, it presented a condensation of a reddish colour, similar to that of clouds at sunset. The general appearance of the spot was that of a light cirro-cumulus.

At 9h. 30m. 40s. there was heard a deep and very strong detonation, accompanied by many others not so intense, similar to the noise produced by a large cannon-ball rolling along the upper storey of a house. This noise was very prolonged; it was found to last two minutes.

Meanwhile the vibration of windows and partitions (not the thick walls) was extraordinary, and the rattling of panes of glass alarming. In some houses all the window-panes were broken.

Judging from the time which elapsed between the light and the sound of the first detonation, the meteor exploded in the air at a

distance not less than 24 kilometres (15 miles); and this number is evidently too low.

Considering the aspect of the spot of smoke, it seems probable that the meteor proceeded from the south-east towards the north-west, and that near the zenith of Madrid it exploded.

Changed into smoke and dust, totally or partially, this smoke was carried away by the upper currents of the atmosphere to the east. We find here a splendid confirmation of the theory which supposes that, at the upper limits of the air, the wind moves from west to east.

A photograph of the phenomenon was taken by an amateur some few minutes after the explosion.

The cloud continued its course to the E.N.E., or E. ¼ N.E., dissolving gradually away, and at 3 p.m. [5½ hours afterwards! ED. *M.M.*] it was still perfectly visible like a light cirrus in the east some 20° above the horizon.

The compression of the atmosphere at the instant of the conflagration was indicated by the registering barometers. In the aneroids the trace is small, but the mercurial one shows that the column rose 1·6 mm (·063 in.), and lowered 0·7 mm (·028 in.), the amplitude of the total oscillation being 2·3 mm (·091 in.).

In the neighbourhood of Madrid some fragments of the meteor fell, and I have obtained one of them. Externally the fragment is of a black metallic aspect; inside it is of white stony appearance, with some brilliant points like nickel; it weighs 6·3 grams (¼ oz.).

From information received later, it appears that the phenomenon was visible in a large part of the Peninsula, from Sierra de Estrella (Portugal) to Denia on the Mediterranean coast, and from Segovia to Aguilas, or a distance of 700 kilometres (435 miles) from east to west, and 400 kilometres (250 miles) from north to south. These are inferior limits.

AUGUSTO ARCIMIS.

HIGH BAROMETER.

To the Editor of the Meteorological Magazine.

SIR,—There have been now two *consecutive* months, *i.e.*, January and February last, of abnormally high barometrical pressure; the 9 a.m. mean here for January being 30·361 in. and for February, 30·356 in., is not this very unusual?—Yours obediently,

K. I. MARKS.

9, *Randolph Gardens, Maida Vale, W., 4th March*, 1896.

[As far as we can trace, the only parallel case, and it is noteworthy as covering *three months*, instead of two, was in 1779, when the means were :—

January ... 30·387 in. February ... 30·332 in. March ... 30·270 in.

ED.]

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, February 19th, at the Institution of Civil Engineers, Westminster. Mr. Edward Mawley, F.R.H.S., President, in the chair.

The Report on the Phenological Observations for 1895 was presented by Mr. Mawley, in which it was shown that, owing to the great frost at the beginning of 1895, all the first spring flowers made their appearance very late; and it was not until the middle of June that this retardation was overcome. During July the dates recorded were, as a rule, exceptionally early. The yield of all the farm crops, except potatoes, was exceedingly poor. Pears and plums yielded badly, but there was a splendid crop of apples and also of all the small fruits. As regards vegetation generally, seldom has a year ended under conditions as favourable for the one succeeding it.

Mr. R. H. Scott, F.R.S., read a paper on the recent unusually high barometer readings in the British Isles, in which he stated that the daily weather chart for 6 p.m., on January 8th, was the first in these islands that ever showed 31 inches. The station was Stornoway, and by the next morning, all over the northern portions of Great Britain and Ireland, the barometers were above 31 inches. The highest reading of all was 31·119 in., photographically recorded at Glasgow at 9 a.m., on the 9th. The barometric pressure then gave way, and the region of highest readings moved southwards along our west coast and finally left the South of Ireland on the 15th. Weather throughout the period was mild, an unusual thing, with a very high barometer. At the end of the month a second anti-cyclone spread over the country, when the barometer rose to 30·96 in. at Cork. Reference was made to previous excessively high barometer readings in England and in Siberia, and it was stated that a reading of 31·62 in. at Barnaoul in Siberia, in 1877, was probably the highest ever observed.

Mr. R. Inwards, F.R.A.S., read a paper on "Turner's Representations of Lightning," which he considered to be remarkably true to nature, and demonstrated the same by placing a photograph of Turner's work side by side with a photograph of a real flash of lightning.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, OCTOBER, 1895.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	74·4	1	26·6	28	54·1	40·5	42·1	84	111·9	24·1	2·84	14	6·2
Malta	90·8	27	53·3	20	80·0	65·9	61·4	75	135·1	47·3	1·17	6	4·5
Mauritius	82·3	31	65·0	20	79·8	67·6	63·7	75	133·6	54·9	·64	11	5·4
Calcutta	91·3	6	67·6	8	85·9	73·3	69·8	73	150·7	60·9	2·79	5	3·6
Bombay	92·6	11	72·8	20	87·7	76·5	74·0	77	144·5	64·9	3·62	7	4·2
Ceylon, Colombo	88·2	19	72·3	...	85·0	74·6	72·0	83	157·0	69·0	30·36	30	8·2
Melbourne	86·6	12	39·1	4	71·1	50·3	47·3	66	136·0	31·0	·57	8	4·9
Adelaide	96·5	19	45·8	3	78·0	53·2	48·0	53	150·3	37·0	·38	8	3·7
Sydney	83·8	18	52·5	30	73·6	57·6	62·0	64	140·0	38·6	·64	10	3·2
Wellington	75·5	29	35·0	1	60·6	48·2	45·2	70	136·0	24·0	4·06	12	4·5
Auckland	69·0	28*a*	44·0	2	62·5	50·3	47·1	71	130·0	40·0	3·79	19	5·0
Jamaica, Kingston	93·5	4	71·4	24	88·0	73·5	71·7	82	...	...	7·21	15	5·4
Trinidad	91·0	4, 18	68·0	5, 21	88·9	71·0	72·9	79	170·0	66·0	10·89	16	...
Grenada	86·4	5	71·0	17	83·8	74·7	71·5	76	157·0	...	5·94	19	3·7
Toronto	65·8	2	23·2	21	51·1	35·1	34·3	72	87·2	17·4	1·04	11	5·6
New Brunswick, Fredericton	70·0	7	14·8	22	51·8	30·7	33·4	71	...	...	1·84	12	4·4
Manitoba, Winnipeg	75·3	12	11·0	28	50·5	26·1	...	...	...	...	·33	7	5·8
British Columbia, Esquimalt	70·1	18	33·2	29	55·9	42·1	45·7	92	...	...	·46	11	5·8

a—and 28.

REMARKS.

MALTA.—Adopted mean temp. 71°·0, 1°·5 above the average. Mean hourly velocity of wind 9·9 miles. Average temp. of sea 74°·6. Thunderstorms on 17th and 18th, and Lightning on 13th, 19th and 22nd. J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·2 above, of dew point 1°·9 above, and rainfall 1·04 in. below, their respective averages. Mean hourly velocity of wind 9·8 miles, or 1·5 miles below average; extremes, 27·1 on 7th, and 0·0 on 11th; prevailing direction, E.S.E. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms on the 8th, 9th and 28th. D. G. MANTELL.

Adelaide.—Mean temperature 3°·7 above the average of 38 years, and the highest ever recorded at Adelaide in October. Rainfall 1·52 in. below the average, having only once been less than in the present month. C. TODD, F.R.S.

Sydney.—Mean temperature 2°·3 above, humidity 5·6 below, and rainfall 2·24 in. below, their respective averages. The Colony generally is suffering from a severe drought since March last. H. C. RUSSELL, F.R.S.

Wellington.—Showery from 7th to 9th, otherwise fine up to the night of the 15th, from 15th to 25th wet weather, and the remainder fine. Prevailing winds N.W.; frequently strong. T and L on 25th and 31st. Mean temp. 0°·8 above, and rainfall ·31 in. below, the average. R. B. GORE.

Auckland.—A cool showery month. Mean temp. 1° below the average; rainfall half-an-inch above the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 3·0 miles. Rainfall in Kingston about the average, but in each of the four divisions the fall was about one-third above the average. R. JOHNSTONE.

TRINIDAD.—Rainfall 4·22 in. above the 30 years average. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, FEBRUARY, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	·40	XI.	Lake Vyrnwy	1·31
,,	Birchington, Thor	·33	,,	Corwen, Rhug	·65
,,	Hailsham	·33	,,	Carnarvon, Cocksidia ...	1·06
,,	Ryde, Thornbrough	·29	,,	I. of Man, Douglas	2·18
,,	Emsworth, Redlands ...	·46	XII.	Stoneykirk, Ardwell Ho.	1·87
,,	Alton, Ashdell	·55	,,	New Galloway, Glenlee	3·23
III.	Oxford, Magdalen Col..	·31	,,	Lilliesleaf, Riddell	1·48
,,	Banbury, Bloxham	·46	XIII.	N. Esk Res. [Penicuick]	1·95
,,	Northampton, Sedgebrook	·52	,,	Edinburgh, Blacket Pl..	·85
,,	Alconbury	·49	XIV.	Glasgow, Queen's Park..	1·76
,,	Wisbech, Bank House...	·80	XV.	Inverary, Newtown	5·77
IV.	Southend	·68	,,	Oban, The Corran	4·24
,,	Harlow, Sheering..... ...	·50	,,	Islay, Gruinart Schools..	4·20
,,	Colchester, Lexden	·67	XVI.	Dollar.....	1·85
,,	Rendlesham Hall	·38	,,	Balquhidder, Stronvar...	4·00
,,	Diss	...	,,	Ballinluig	·99
,,	Swaffham	·69	,,	Dalnaspidal H.R.S.....	3·30
V.	Salisbury, Alderbury ...	·31	XVII.	Keith H.R.S.....	·89
,,	Bishop's Cannings	·50	,,	Forres H.R.S.	·34
,,	Blandford, Whatcombe .	·52	XVIII.	Fearn, Lower Pitkerrie..	·71
,,	Ashburton, Holne Vic...	1·24	,,	N. Uist, Loch Maddy ...	4·15
,,	Okehampton, Oaklands.	·88	,,	Invergarry.....	4·15
,,	Hartland Abbey	·99	,,	Aviemore H.R.S.	1·01
,,	Lynmouth, Glenthorne.	·62	,,	Loch Ness, Drumnadrochit	1·31
,,	Probus, Lamellyn	·75	XIX.	Invershin	·89
,,	Wellington, The Avenue	·56	,,	Scourie	2·86
,,	Wincanton, Stowell Rec.	·52	,,	Watten H.R.S.....	·76
VI.	Clifton, Pembroke Road	·55	XX.	Dunmanway, Coolkelure	4·91
,,	Ross, The Graig	·24	,,	Cork, Wellesley Terrace	1·70
,,	Wem, Clive Vicarage ...	·52	,,	Killarney, Woodlawn ...	3·08
,,	Cheadle, The Heath Ho.	1·72	,,	Caher, Duneske	1·34
,,	Worcester, Diglis Lock	·23	,,	Ballingarry, Hazelfort...	1·57
,,	Coventry, Coundon	·53	,,	Limerick, Kilcornan ...	1·34
VII.	Ketton Hall [Stamford]	·70	,,	Ennis	...
,,	Grantham, Stainby	·96	,,	Miltown Malbay	2·43
,,	Horncastle, Bucknall ...	·43	XXI.	Gorey, Courtown House	1·88
,,	Worksop, Hodsck Priory	·65	,,	Athlone, Twyford	1·52
VIII.	Neston, Hinderton	1·11	,,	Mullingar, Belvedere ...	1·87
,,	Southport, Hesketh Park	1·03	,,	Longford, Currygrane...	1·93
,,	Broughton-in-Furness ...	4·41	XXII.	Woodlawn	1·67
IX.	Ripon, Mickley.....	·52	,,	Crossmolina, Enniscoe ..	2·08
,,	Melmerby, Baldersby ...	·46	,,	Collooney, Markree Obs.	2·13
,,	Scarborough, Obs.	·57	,,	Ballinamore, Lawderdale	2·62
,,	Middleton, Mickleton ...	1·29	XXIII.	Lough Sheelin, Arley...	1·61
X.	Haltwhistle, Unthank...	1·72	,,	Warrenpoint.....	2·97
,,	Bamburgh	·55	,,	Seaforde.....	1·77
,,	Keswick, The Bank.....	3·27	,,	Belfast, Springfield	2·08
XI.	Llanfrechfa Grange	·65	,,	Bushmills, Dundarave..	2·59
,,	Llandovery	1·23	,,	Stewartstown	2·11
,,	Castle Malgwyn	1·51	,,	Killybegs	3·70
,,	Builth, Abergwesyn Vic.	3·29	,,	Lough Swilly, Carrablagh	3·18
,,	Rhayader, Nantgwillt...	2·17			

FEBRUARY, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·30	— 1·58	·08	20	8	56·4	28	23·2	26	9	16
II.		Maidstone (Hunton Court)...	·58	— 1·22	·25	21	3	...	...	...	...	...	...
,,		Strathfield Turgiss	·49	— 1·51	·19	8	11	57·6	28	17·1	26	13	19
III.		Hitchin	·37	— 1·38	·07	8	11	54·0	12	18·0	25	12	...
,,		Winslow (Addington)	·43	— 1·73	·16	8	8	56·0	12*a*	17·0	26	13	17
IV.		Bury St. Edmunds (Westley)	·83	— ·73	·39	29	8	53·0	8, 12	...	...	...	...
,,		Norwich (Brundall)	·47	...	·21	29	8	56·2	19	25·6	26	9	19
V.		Weymouth(LangtonHerring)	·37	— 2·23	·15	8	5	54·0	29	26·0	24*g*	8	...
,,		Torquay (Cary Green)	·46	...	·22	8	6	56·4	28	29·0	2	4	12
,,		Polapit Tamar [Launceston]..	·78	— 2·49	·26	19	9	56·1	10	22·4	24	7	12
VI.		Stroud (Upfield)	·37	— 2·19	·15	8	7	54·0	10*b*	25·0	26	11	...
,,		ChurchStretton(Woolstaston)	·54	— 1·91	·18	29	8	54·5	28	22·0	26	13	17
,,		Tenbury (Orleton)	·40	— 2·08	·14	20	9	58·1	12	24·5	2	12	14
VII.		Leicester (Barkby)	·57	— 1·24	·16	20	9	57·0	19	16·0	25	15	24
,,		Boston	·67	— 1·01	·25	29	6	55·0	19	22·0	26	13	...
,,		Hesley Hall [Tickhill].....	·77	— ·73	·22	28	8	55·0	8	19·0	26	14	...
VIII.		Manchester(PlymouthGrove)	1·79	— ·26	·62	29	11	55·0	9	22·0	18	14	16
IX.		Wetherby (Ribston Hall) ...	·26	— 1·32	·14	29	2	...	...	...	...	...	...
,,		Skipton (Arncliffe)	2·03	— 2·66	·73	29	13	..	...	...	...	...	...
,,		Hull (Pearson Park).	·66	— 1·14	·26	20	8	54·0	8, 9*a*	23·0	26	12	13
X.		Newcastle (Town Moor)	·62	— ·78	·31	20	5	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	10·08	— 2·56	3·13	7	16	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·05	— 2·14	·27	8	16	...	...	...	...	...	...
,,		Haverfordwest	1·18	— 2·94	·28	8	18	53·1	10	28·0	24*h*	6	15
,,		Aberystwith (Gogerddan) ...	1·41	— 1·85	·48	29	10	52·0	10*c*	...	..	.	...
,,		Llandudno.....	1·06	— ·86	·38	29	13	58·2	8	26·8	18	...	...
XII.		Cargen [Dumfries]	2·20	— 1·45	·52	7	10	53·0	5	24·8	24	7	...
,,		Jedburgh (Sunnyside).....	1·06	— ·45	·45	20	7	52·0	7, 8*d*	24·0	19	8	...
XIV.		Colmonell	2·60	...	·77	29	14	59·0	11	23·0	20	...	...
XV.		Lochgilphead (Kilmory).....	4·85	— ·34	1·17	25	19	...	...	30·0	25	7	...
,,		Mull (Quinish).....	4·16	— 1·31	·78	25	18	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·30	— 1·45	·30	8	7	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·00	— 1·10	·30	20	10	54·8	5	26·4	24	9	...
XVII.		Braemar	·83	— 2·53	·20	20	10	50·0	5	26·4	27	13	17
,,		Aberdeen (Cranford)	·96	...	·30	20	10	55·0	5, 7	28·0	27	7	...
XVIII		Strathconan [Beauly]	1·98	— 2·73	·56	28	12	...	...	...	...	...	...
,,		Glencarron Lodge.....	7·34	...	2·06	11	17	52·6	7	27·8	19	6	...
,,		Cawdor [Nairn]	·80	— 1·43	·17	29	12	...	...	...	...	...	...
XIX.		Dunrobin	1·86	— ·23	·63	25	10	54·0	11	29·0	29	7	...
,,		S. Ronaldsay (Roeberry).....	1·86	— ·78	·24	29	18	50·0	10*e*	27·0	28	4	...
XX.		Darrynane Abbey.....	3·36	...	·67	25	17	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	2·05	— 2·03	·82	25	10	58·0	12	29·0	4	2	...
,,		O'Briensbridge (Ross)	1·25	...	·32	25	12	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	1·38	— 1·70	·57	25	9	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	·87	— 1·48	·32	25	10	56·7	8	31·9	18	1	10
XXII.		Ballinasloe	1·63	— 1·15	·62	25	10	52·0	8, 28	29·0	1	5	...
,,		Clifden (Kylemore)	5·43	...	1·67	25	12	...	...	...	...	...	...
XXIII		Waringstown	1·26	— 1·19	·51	25	9	54·0	7*f*	30·0	24*i*	8	11
,,		Londonderry (Creggan Res.).	2·82	— ·21	·73	25	12	...	...	...	...	...	...
,,		Omagh (Edenfel)	2·18	— ·51	·63	25	11	54·0	11	31·0	17	1	6

+Shows that the fall was above the average ; —that it was below it.

a—and 19. *b*—and 12, 28. *c*—and 11, 21, 22. *d*—and 21. *e*—and 11. *f*—and 21, 29. *g*—and 25. *h*—and 27. *i*—and 26.

METEOROLOGICAL NOTES ON FEBRUARY, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—The weather at first was dry and fair with slight showers at night, and with high temp. right through the middle of the month until the 23rd, when a very sharp but short snap of cold set in which lasted until the 29th. Primroses in flower on 6th, white dead nettle on 9th, lungwort on 29th; honey bee seen on 19th; solar halo on 27th.

ADDINGTON.—Another dry February, making six in the last 11 years with less than an inch of R; whereas during the previous 15 years there was only one similar instance, in 1871. The only sharp frosts were those on the 25th, 26th, and 27th. Dense fog on 6th and 10th, foggy on 11th and 18th.

BURY ST. EDMUNDS, WESTLEY.—A fine dry month with high barometer; a cold spell from 23rd to 27th.

NORWICH, BRUNDALL.—A very dry, mild month. R 1·32 in. deficient. The seventh February out of the last fourteen with less than an inch of rain. How is it that February is proverbially known as "Fill Dyke"?

WEYMOUTH, LANGTON HERRING.—A very calm month. Average temp. at 9 a.m. 39°·4, or 0°·1 above the average of 24 years. A cold snap occurred from the 23rd to the 27th inclusive. Bar. readings very high throughout, except from 19th to 22nd. Fogs on 9th, 10th, 18th, 20th, and 22nd. For the first two months of the year the rainfall is only 1·46 in., or a deficit of more than 70 per cent.

TORQUAY, CARY GREEN.—Rainfall 2·30 in. below the average. Mean temp. 43°·4, or 0°·4 above the average. Duration of sunshine 52 hours 10 minutes, being 30 hours 20 minutes below the average; 9 sunless days.

POLAPIT TAMAR [LAUNCESTON].—Generally calm and bright and very dry, the R being less than a quarter of the average. Slight fog early on 12th. Dense fog on 13th till noon, and on 14th till 10 a.m.

WOOLSTASTON.—A fine and seasonable winter month with frosty nights; very little rain fell till the last day. Mean temp. 39°·5.

TENBURY, ORLETON.—Another very dry month; the fourth February within 10 years with a R of less than half-an-inch. The first 14 days were very warm, but from the 15th to the end of the month the temp. was below the average, with the sharpest spell of frost of the winter from the 23rd to the 27th. The mean temp. of the month was about half-a-degree lower than the average. Fogs on four days, dense on 19th and 21st.

LEICESTER, BARKBY.—Already great deficiency of water. Mean temp. 38°·5.

MANCHESTER, PLYMOUTH GROVE.—Upon the whole, very fine, mild weather for the season. Thick fog on 14th, 15th, and 18th. Mean temp. 40°·5.

WALES.

HAVERFORDWEST.—This month, like January, was remarkable for dampness, mildness, and small rainfall. At times a good deal of wind prevailed, sometimes reaching the force of a moderate gale, and at times there was much fog. From the 17th to 19th the temp. was low at night and again from the 21st to the end, with a bitter easterly wind. E. or S.E. winds prevailed more or less during the month. The quantity of R that fell was very small, but not so small as in 1891 and 1895.

ABERYSTWITH, GOGERDDAN.—Very mild throughout the month, but very little sunshine.

SCOTLAND.

CARGEN [DUMFRIES].—An uneventful month. The first 16 days were exceptionally warm for the season, the mean temp. of the period being 44°, upwards of 20° higher than that of the corresponding period of 1895. With the exception of a pretty stiff breeze from S. on 7th and 8th the winds were light, westerly and southerly prevailing up to the 16th, northerly and easterly during the remainder. Barometrical pressure was unusually high. Sunshine was registered for only 29 hours, about one-third of the average. Vegetation during the first half made very rapid strides, but received a timely check after the 16th. Pastures very fresh and green.

JEDBURGH.—Up to the 23rd the weather was mild for the season; for the next five days it was cold but dry, with wind from S. or S.E. The barometer throughout was very high. A slight shower of S on the morning of 28th melted almost as it fell. Agricultural work far advanced.

COLMONELL.—Rainfall 1·25 in. below the average of 19 years. Mean temp. 43°·0. About an inch of S fell on 25th.

BRAEMAR.—Mean temp. 39°·0, 17°·7 above that of February, 1895.

ABERDEEN, CRANFORD.—The month was very mild.

S. RONALDSAY, ROEBERRY.—A very fine month until the last week, when southerly gales occurred. Mean temp. 41°·3.

IRELAND.

WATERFORD, BROOK LODGE.—A remarkably mild month, everything very forward. Mean temp. 45°·7.

O'BRIEN'S BRIDGE, ROSS.—A singularly fine month. Abundant sunshine, no frosts, everything forward as at the end of March.

DUBLIN.—A fine, dry, mild, often genial month. A complete contrast to February, 1895, which was the coldest experienced for 40 years. There was neither S nor H, and scarcely any frost in or near Dublin. The mean temp. (45°·2) was not less than 11° above that of February, 1895, while it was also 2°·4 above the average. Absolute drought prevailed from the 9th to the 18th inclusive, and three-eighths of the entire rainfall of the month was measured on the 25th. Foggy on eight days. Amount of cloud (6·6) almost exactly the average. High winds on eight days, but never reaching the force of a gale. Lunar halo on the 25th; faint aurora on the 18th.

OMAGH, EDENFEL.—Like January, the past month was more of a fine autumnal than of a wintry character; many days in their clear soft calmness would have done no discredit to the Riviera. The rain that fell was mostly at night, and frost was only once registered in the screen; a startling contrast to the 27 times of February, 1895.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXIII.] APRIL, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

The Rev. Charles Bigman Griffith,

1830–96.

Now that our rainfall and meteorological correspondents number considerably over 3,000, it has become impossible to give obituary notices in these pages of any but those who have done exceptional work; and that certainly was the case with Mr. Griffith.

Although a naturalist and microscopist rather than a physicist, Mr. Griffith was always ready to help in any branch of meteorology, and besides keeping a full record, practically without a break, for a third of a century, he was always ready to undertake any necessary experiments. When Colonel Ward had concluded his observations on the relative indications of rain gauges of different sizes, and of similar sizes at different heights, the whole series was transferred to Strathfield Turgiss, and the little rectory and outbuildings were (as shown in the frontispiece to *British Rainfall*, 1868) appropriated to investigations on the effect of buildings on the amount indicated by gauges in bad positions. Later on he undertook the elaborate experiments upon the relative temperatures shown by thermometers mounted upon various patterns of thermometer stand, the mere recording of which was equivalent to the care of at least half-a-dozen ordinary meteorological stations. Lastly came the experiments upon evaporation with nearly two dozen different patterns, with records of the temperature of the water in each, and also in the river Loddon. The results of the automatic recorder attached to the tank, and the whole of the original observations, were placed in the hands of Mr. Rogers Field, C.E., in 1882 or 1883, but nothing has yet appeared from his pen, though fortunately the chief practical results, and several engravings of the instruments, were given in *British Rainfall*, 1889.

Mr. Griffith was a worker rather than a writer; had he written more. the parallelism between the two Hampshire rectors, Gilbert White of Selborne in the 18th century, and Griffith of Strathfield Turgiss in the 19th, would have been noteworthy.

GAUGING THE ATMOSPHERE.

WE have just been reading the paper* submitted to the Antwerp Conference by Signor Ventosa, Chief Astronomer at the Madrid Observatory, and wish to couple with a brief notice of it, reference to other somewhat analagous work.

Signor Ventosa has for many years been keeping a record of the direction and amount of the tremors on the edge of the sun, as seen through the large telescope of the Madrid Observatory, and he has tried, by throwing the sun out of focus, to ascertain the differences in the tremors at different heights in the atmosphere—*i.e.*, practically, he has focussed the telescope on layers of the atmosphere at different altitudes, and has obtained remarkably accordant results.—We must refer readers who are interested in the subject to his paper for details of this original and fascinating research.

We intimated above that other men have been labouring on this subject in directions which have much in common.

For years the variation in the scintillation of the stars has been associated with weather changes, and the late M. Montigny devoted much time and care to observations with his "scintillomètre."

Professor C. Zenger, of Prag, has devoted years to the study of small photographs of the sun taken (we believe) out of focus, and has published several works upon the utility of such photographs as indicators of coming weather.

The late Mr. Capron and others have been strong believers in the utility of the study of the Rain-band Spectroscope. And now we have Signor Ventosa's researches.

We should not be surprised if valuable discoveries were made at any observatory where all these methods were carried on at once.

A WET FEBRUARY IN MAURITIUS.

DR. MELDRUM has just sent us a short note as to the unprecedented rainfall in Mauritius in February, 1896.

At the Observatory the average fall for February is 7·15 inches; the total this year was 30·06 inches, or more than four times the average. Between 9 a.m. on February 19th and 10.25 a.m. on February 20th (25½ hours) there fell at the Observatory 17·34 inches.

The monthly totals at stations in the Upland district were equally unprecedented, and reached 40, 50, and even 55 inches.

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* *La direction des vents superieurs déterminée par les ondulations du bord des Astres.* 8vo, Antwerp, 1895.

ROYAL METEOROLOGICAL SOCIETY.

AT the monthly meeting of this Society on Wednesday evening, March 18th, Mr. E. Mawley (President), in the chair, Mr. Frederic Gaster, F.R.Met.Soc., of the Meteorological Office, delivered a Lecture on "Weather Forecasts and Storm Warnings, how they are prepared and made known," which was illustrated by instruments, diagrams, and numerous lantern slides.

Mr. Gaster said that in the preparation of forecasts, the position held by the barometer was so much more important than that of any other instrument, that its action must be fully comprehended if the rest of the work was to be at all clearly understood. The lecturer having fully explained this, referred to the use of a single isolated instrument, and showed what new light was given to the observer who could have telegraphed to him simultaneous observations from a large number of places scattered over a considerable area of the earth's surface. The variation in the distribution of pressure was dealt with, isobars were drawn, and the phenomena which they exhibit in the way of high and low pressure areas described. An explanation was given of the terms "cyclonic" and "anti-cyclonic," and the generally opposite characteristics of these two systems were stated. Mr. Gaster next drew attention to the obvious importance of the variation in the weather over a given area, caused by alterations in the position of the cyclonic and anticyclonic systems, and the importance of the fact that the former tended to move round the latter from left to right. This led to some remarks on the indications observed when disturbances were advancing towards our islands from different points. Attention was drawn to secondary systems, both of high and of low pressure, the forms they assume, and their effect on the weather which, but for their presence, would probably have accompanied their primaries; and the necessity for allowing for such systems in sending warnings to our coasts. The lecturer then remarked on the value of auxiliary information, such as that of decided changes in the direction of the wind, sudden changes of temperature, the movements of clouds at different levels, observations at high level stations, and telegrams from the United States.

Mr. Gaster next explained how the information is made known to the public. Forecasts are issued by the Meteorological Office in the Daily Weather Report, and also communicated to the Press, &c. Hay harvest forecasts are issued to certain selected authorities who circulate them as much as possible in their neighbourhood. Storm warnings are telegraphed to our coasts with instructions to hoist the cone—point up, when the gale is probable from points between north and east, and point down when from points between south and west. In conclusion, the lecturer drew attention to the marked improvement in these warnings in recent years, and to some of the occurrences which, from time to time, caused failures.

THE INDEX TO THE METEOROLOGICAL MAGAZINE.

I HAVE had many extremely kind letters respecting the above, but, although greatly obliged thereby, do not think it necessary to print them. As there are 360 numbers, and probably more than 20 entries will have to be made for each, *i.e.*, 7,200 entries, its appearance must not be expected for some months. *British Rainfall*, 1895, must come first, and the final revision of the Index will probably have to take the place of—or accompany—an autumn holiday.

G. J. SYMONS.

THE MILD WINTER.

To the Editor of the Meteorological Magazine.

SIR,—I have been so frequently asked whether the temperature of the past winter has not been unprecedentedly mild, that I give the following statistics to prove that such an impression is unfounded. During the last twenty-one years, there have been six milder winters recorded here, and it may be as well to mention that meteorologists consider the winter season to comprise the period from the first day of December in the one year to the last day of February in the next.

Mean Temperature of Mild Winters.

	1873-4.	1876-7.	1877-8.	1881-2.	1882-3.	1883-4.	1895-6.
Mean Temp....	39°·6	42°·0	39°·3	39°·0	39°·6	40°·0	38°·8
Above Mean...	2°·5	4°·9	2°·2	1°·9	2°·5	2°·9	1°·7

The mean temperature of winter here is 37°·1, so that the winter of 1895–96 has only been 1°·7 warmer than the average. It has been 3°·2 colder than that of 1876–77.

With respect to the rainfall, I may remark that although the amount for December was nearly an inch above the average, yet for January and February it did not amount to one-third of the average for those two months. The total rainfall for the three winter months was 6·20 inches, which is 3·27 inches below the average of 24 years.—I am, yours obediently,

C. LEESON PRINCE.

The Observatory, Crowborough Hill.

To the Editor of the Meteorological Magazine.

SIR,—In 1894 I wrote you (*Met. Mag.*, p. 18), showing reason why "we might expect the first quarter of 1896 or 1897 to have a very high mean temperature"; and I may be permitted (without posing in the mantle of a weather prophet) to refer to this in the light of recent experience. The mean temperature of last quarter, however, apparently falls a little short of 43°. Whether we shall have a fine, hot summer, as in the cases cited in my letter, remains to be seen.

Yours, &c.,

A. B. M.

THE AMERICAN METEOROLOGICAL JOURNAL.

WE are extremely sorry to hear that this ably conducted periodical will not appear after the present month.

Scarcely anything which money or brains could do, has been spared in order to ensure success, but we believe that from the first the publication has been unprofitable. How much has been lost, and who has borne it, we do not know. On this side of the Atlantic it is generally believed that during its long (12 years) and gallant fight for existence, the bulk of the expense has fallen upon Mr. Laurence Rotch, the founder, proprietor, and director of the Blue Hill Observatory. Of the merit of the twelve volumes of the American Meteorological Journal there cannot be two opinions, and we regret that the United States do not contain a sufficient number of meteorologists to support a monthly periodical.

The only gleam of brightness in the notice which we have received is that arrangements have been made with the editor of *Science* that a portion of that periodical shall be devoted to meteorology, and that Prof. R. de C. Ward, the present editor of the American Meteorological Journal, shall supervise it.

What interesting bits *Science* contains may be judged from the following portion of an article :—

THE METEOROLOGICAL STATIONS IN PERU ESTABLISHED BY HARVARD COLLEGE, U.S.A.

BY R. DE C. WARD.

The meteorological advantages for astronomical work in the region of Peru selected for occupation are very great. The temperature seldom falls below 40°, or rises above 75°. The rainy season is very short, and but little rain falls, generally less than four inches. November marks the beginning of the cloudy season; December is fairly clear, and January to March are cloudy and rainy. During the rest of the year the atmosphere is very dry, and the sky prevailingly clear. In the rainy season it by no means rains every day, there being often a week or a fortnight during which no rain falls. The excessive dryness of the climate, in which vegetation is maintained only by constant irrigation, the short rainy season and the small amount of cloudiness combine to make this a very favourable region for astronomical work.

There are at present eight meteorological stations in Peru, maintained by the Harvard College Observatory. The principal one is at Arequipa, about 80 miles from the coast, and at an altitude of 8,050 feet above the sea. The city itself is situated in a little oasis formed by a river valley at the foot of the Cordillera, a little above the lower-lying desert. At Mollendo, on the sea-coast, there is a meteorological station 85 feet above sea level. Between Mollendo and the main station at Arequipa, another station has been established, at La Joya, about in the centre of a rainless, barren region, and at an elevation of 4,140 feet. The most interesting station of all is that on the summit of the volcano El Misti, 19,200 feet above the sea, lying north-east of Arequipa,

about ten miles distant. This station, established after much hardship and maintained with considerable difficulty, is now the highest meteorological station in the world. Mr. S. P. Fergusson, of Blue Hill Observatory, Massachusetts, has recently constructed a meteorograph for the Misti, which records automatically temperature, pressure, humidity, and wind direction and velocity, and will run three months without re-winding. The instrument will obviate the necessity of the frequent visits now made to the summit by the observers at Arequipa.

The other stations are as follows : Flank of El Misti, 15,700 feet, about the altitude of Mont Blanc ; Alto de los Huesos, 13,400 feet, a high desert plateau east of El Misti ; Cuzco, between the eastern and western Andes, 16,100 feet, and Santa Ana, east of the Andes, in the Urubamba Valley, 3,400 feet above the sea.

This continuous line of stations, reaching from the coast inland over 350 miles, and including such great altitudes as the summit and flank of El Misti, is equalled nowhere else in the world, and the results which the data there collected will furnish are certain to be of great importance to meteorology.—*Science*, New York, March 27th, 1896.

EARLY DAMAGE BY LIGHTNING IN 1896.

MARCH 4.—In the evening, a house struck at St. John's, Jersey ; chimneys overthrown and broke through the roof.

MARCH 4.—At night, St. Peter's House, Jersey, struck, and also a tree in the grounds. This may have been a multiple stroke, as several parts of the house and outbuildings, including a cow-house, were damaged.

MARCH 16.—About 7.30 a.m., house struck and chimneys demolished at Sunny Bank, Cragg Vale, Mytholmroyd, Yorks.

MARCH 24.—In evening, chimney struck at the "Jordan Arms," New Mills, Derbyshire, but little damage beyond stripping off the plaster.

MARCH 24.—About 9 p.m., a bricklayer, on attempting to open the garden gate of his house, at Northallerton, was struck by L, and his arm scorched.

MARCH 24.—About 3 p.m., an empty house at Mark Quay, Sunderland, struck, and a hole 15 ft. square made in the roof.

MARCH 25.—About 3 p.m. a stack at North Ormesby, near Middlesborough, was struck, and ignited.

MARCH 25.—Chimney of a draper's shop in Union Lane, Gateshead, struck, and knocked through the roof.

REVIEWS.

Etat actuel de nos connaissances sur l'Hydrométrie du Bassin de la Seine. par GEORGES LEMOINE, Ingénieur en chef des Ponts et Chaussées (Extrait des *Annales de Géographie*). Paris, Armand Collin and Cie, large 8vo, 21 pages, numerous diagrams and large coloured map.

LONDON is still waiting for what M. Belgrand did for Paris in 1854, and until a few more of our legislators appreciate what is understood in France by the expression Hydrométrie, there is little use in repeating that which we have often said, but which the authorities choose to ignore. It is immaterial to us; it is for those who suffer from floods to move, not for us.

This reads like a digression, but is the natural result of perusing the excellent narrative which M. Lemoine has given (in the above paper) of the work to which he has devoted the best years of his life, and which has been rewarded by most gratifying success. So much so, that now, not merely is the height to which every flood in Paris will rise predicted within a few inches, but there is a department under the Minister of Public Works branches of which announce with great precision the floods of the Saone at Chalon, of the Loire at Nevers and Orleans, and of the Garonne at Agen.

There is no one so competent to write upon the subject as M. Belgrand's old colleague and successor, and the paper by its clear expressions and statements, proves how thoroughly M. Lemoine has mastered the subject.

When shall we have any proper records of our British rivers?

Rapporto Annuale dell' Osservatorio Astronomico Meteorologico di Trieste . . . . . per l'anno 1893, redatto da ED. MAZELLE. Vol. X. Trieste, 1896, 4to, 114 pages.

THIS volume which is, we believe, in all respects conformable to the International rules, contains the records for the observatory at Trieste and for four stations in the immediate neighbourhood of that city, and for eight other stations distributed along the eastern shore of the Adriatic for about 300 miles south-east of Trieste, in fact down to the southern extremity of Dalmatia.

We are sorry to see that at several of the stations the rain gauges are on roofs. It seems strange that the inaccuracy of the records of instruments so placed is not generally recognised. At Trieste Observatory the rain gauge is stated to be 87 feet above the ground.

It is a pity that nowhere in the volume is there any comparison of the year to which it is devoted (1893) with previous years—nothing to show whether it was hotter. colder, drier, or wetter, than the average. Of course this could be ascertained by referring to previous volumes, but we think that a few pages devoted to the subject would be an improvement.

We are rather surprised to see only one temperature exceeding 93°, viz., 96°·3, at Punta d'Ostro, on July 2nd. Sharp frosts we expected to find, but scarcely a temperature of 17°·8 in Trieste, and of 5°·9 on the adjacent hills, but those are the records for January 14th, 1893.

The rainfall, considering the altitudes of the gauges and that the values are for only one year, 1893, are not to be accepted as more than approximate, but the following are the figures :—

Station.	N. Lat.	E. Lon.	Altitude	Height of Gauge above Ground.	Total Rain 1893.
	° ′	° ′	ft.	ft.	in.
Punta d'Ostro	42 27	18 34	210	13	27·1
Ragusa	42 38	18 7	80	36	77·7
Lissa (Semaphore)	43 5	16 14	79	26	17·9
Lesina	43 11	16 27	28	15	28·6
Lussin Grande	44 31	14 30	56	3	42·0
Lussin Piccolo	44 32	14 28	79	3	35·0
Pola	44 52	13 51	104	4	25·8
Fiume	45 19	14 27	16	10	53·8
Trieste	45 39	13 46	85	87	35·1
Basovizza	45 39	13 52	1220	5	46·5
Barcola	45 41	13 45	49	4	37·4
Opcina	45 41	13 47	1050	6	33·1

Annuaire pour l'an 1896 *publié par la Société Belge d'Astronomie.* Guide de l'amateur Astronome et Météorologiste. Bruxelles, Inst. Nat. de Géographie, 1896, small 8vo, 180 pages, numerous woodcuts and six plates.

THE young Belgian Astronomical Society has started boldly by preparing the present volume—which has many good features—for instance, on opening it we find apparently two loose plates, but we speedily find that they are duplicates of two given in the book, and that these (one of the size of solar spots, and the other a map of the moon) are specially intended for separate use.

We have often complained of the absurdity of February being two days too short while there is an unnecessary number of months with 31 days, but in this work there is an amusing all round attack on the calendar, summed up as follows :—

(1.) Absence of any definite relation between the days of the week and of the month. The years always begin on a different day of the week ; even in the same year each months begins, and *in no regular order*, with a different day of the week.

(2.) No regularity of sequence with months of 30 or 31 days, sometimes they alternate, sometimes they are consecutive.

(3.) Unreasonable shortness of February.

(4.) Inconvenience from a business point of view of the frequency with which the 1st and 15th of a month fall on a Sunday.

Then the writer takes up M. Armelin's proposal and shows how to get a simplified calendar, with all months of 30 or 31 days, running

in regular order, and with far less discord between the days of the week and of the month than exists at present.

Pages 51 to 63 contain a series of excellent suggestions as to the mode of observing and recording the magnitude, appearance and grouping of sun spots.

M. Vincent on pages 128–131 gives a short paper on the paths most frequently taken by barometric depressions, and on pages 132–138 he gives a series of instructions for the observation of clouds both as to their form and direction of motion. Lastly, Dr. Stroobant gives instructions for observing and recording the paths of shooting stars.

Sur la période de froid du 27 Janvier au 17 Février, 1895, par A. LANCASTER. [Extr. Bull. de l'Ac. roy de Belgique.] Brussels, 1895. 8vo. 12 pages, 1 map.

WE give a rough translation of the first two sentences of this paper, which will sufficiently indicate its style and nature :—

"We must go back to 1838, or nearly sixty years, to find a period comparable as regards cold with that which we have recently experienced. In 1838 the mean daily minimum from January 8th to 27th was (at Brussels) —13°·4 C (7°·9 F.), and the mean temperature —9°·8 C (14°·3 F.), or 11°·9 C (21°·4 F.) below the average. In 1895, from January 27th to February 17th, or 22 days, the mean minimum was —11°·0 C (12°·2 F.), and the mean temperature —6°·6 C (20°·1 F.), or 10°·1 C (18°·2 F.) below the average."

"The intensity of the cold was generally greater in 1838 than in 1895, but it was twice interrupted by the thermometer rising above freezing point, whereas in January and February, 1895, it remained below that point for 23 consecutive days. No such duration had before been recorded, and it renders the winter of 1894–5 as noteworthy as that of 1837–8."

M. Lancaster then proceeds to give an excellent narrative (with map and tables) of the 1895 frost, which in the high land S.E. of Brussels was very severe. We give the figures in Fahrenheit scale for four stations in that district, also the Brussels and London figures for comparison :—

Period—January 27th to February 17th.

Stations.	Altitude. Feet.	Mean Max.	Mean Min.	Mean of Extremes.	True Mean.	Absolute Min.
Beauplateau ...	1509	20°·5	—2°·9	8°·8	11°·1	—11°·6
Bastogne	1654	22·3	—4·0	9·1	11·5	—16 8
Libramont.....	1575	24·6	0·1	12·4	14·4	—14·8
Carlsbourg.....	1299	23·4	—1·5	10·9	13·1	—11·2
Mean of the above		22·7	—2·1	10·3	12·5	—10·6
Bruxelles		27·1	10·0	18·5	19·8	0·5
London		32·0	18·5	25·2	25·9	7·3
London warmer by		4·9	8·5	6·7	6·1	6·8

Therefore, much as Londoners grumbled at the frost, it was about 7° worse in Brussels, and about 15° worse on the hills S.E. of that city. Braemar was the only station in the British Isles to approach that district in severity, and Braemar was about 6° warmer.

Annuaire Météorologique pour 1893. Publié par l'Institut Royal Météorologique des Pays-Bas. Forty-fifth year. Utrecht, 1895, oblong 4to, xxxiv–370–xlix pages.

DR. SNELLEN is gradually getting his publication in accord with the rules of the International Committee—but we notice two respects in which we think that he is wrong.—We have often protested against the shortness of February, but until it is rectified by official and international agreement, we think it a mistake to introduce a period adopted by no one else, and to call it February. We are thoroughly with Dr. Snellen in wishing for the alteration, but we are sure that it is not wise to make a change before other civilized nations (or indeed we presume even Holland itself) have legally adopted it. Dr. Snellen's February consists of January 31st, February 1st to 28th, and March 1st. This, of course, gives three consecutive months of thirty days, but it leaves the two halves of the year with 181 and 184 days respectively.

The other practice to which we take exception is one in which we think that he is greatly improving, but he has still some tables in which the year begins with December 1st. We hope that this is the last volume in which we shall see that system adopted.

As regards the volume generally, we have for it nothing but praise. We should, however, like a little information as to the form of instruments used, and the mode of exposure; we note the serious differences of temperature at Utrecht, and the fact that the rain gauge there is 50 feet above the ground; if such can exist at the principal observatory, one becomes suspicious as to the second and third order stations.

There should be a map of the stations.

It would be better to develop the information on page v, by giving the latitude, longitude and altitude of each station.

Sur la distribution a Vienne et a Thorshavn, des éléments météorologiques autour des minima et des maxima barométriques, par A. AKERBLOM [Bihang till K. Svenska Vet.-Akad. Handlingar.] 8vo. Stockholm, 1895. 36 pages.

A CAREFULLY prepared paper, the nature of which is fully indicated by the title. The diagrams are extremely clear. In a short paper at the end upon the "Movements of Cirri over Cyclones and Anticyclones in Central Germany," M. Akerblom calls attention to a fact which we think has never been mentioned or referred to in these pages, viz., that the direction of the upper currents in Germany is independent of disturbances in the lower portions of the atmosphere, *i.e.*, that the cyclonic movements do not reach up to the cirri.

Klima-Tabeller for Norge. I. Luftens Temperatur af H. MOHN. [Vidensk. Skritter I. Math. naturv. Klasse.] Kristiania, 1895. Large 8vo, 27 pages.

THIS gives an epitome of the best records of the temperature of the air at Norwegian stations, corrected for secular variation and reduced to the mean of the 50 years, 1841–90. by comparison with the fluctuations at Christiania and Vardo. Values are given for 83 stations; of course, we cannot reproduce them all, and, unfortunately, the paper is not accompanied, as it very well might have been, by a map showing the position of the stations, and by a series of isothermal charts. We therefore shall give the values, converted into Fahrenheit's scale for the stations furthest N., E., S. and W. for the highest and lowest station, and for the hottest and coldest.

STATION.	Gjesvær.	Vardo.	Lindesnes.	Helliso.	Jerkin	Holmestrand.	Skudenes	Kontokeino.
Lat. N.	71° 6′	70° 22′	57° 59′	60° 45′	62° 14′	59° 29′	59° 9′	69° 0′
Lon. E.	25 22	31 8	7 3	4 43	9 35	10 19	5 16	23 3
Altitude (ft.)	*23*	*33*	*62*	*62*	*3160*	*10*	*13*	*866*
	°	°	°	°	°	°	°	°
January	25·3	21·9	33·3	36·5	17·2	26·8	35·8	5·9
February ...	24·3	20·8	32·0	35·2	17·2	26·6	34·5	5·5
March.....	25·9	23·2	34·0	36·0	20·5	30·2	35·8	10·4
April	30·4	28·8	40·5	41·0	27·0	39·7	41·5	20·8
May.....	36·9	34·5	48·0	46·4	36·7	49·6	47·7	35·2
June	44·4	42·1	55·0	52·0	46·8	59·0	53·8	47·1
July.....	50·0	47·5	59·2	55·8	49·5	62·1	57·0	53·4
August	50·7	48·6	59·5	55·8	48·7	60·3	57·9	51·1
September ..	43·9	43·3	54·9	53·4	41·4	52·7	54·3	40·5
October	35·6	34·7	46·9	46·8	31·1	43·2	47·3	25·5
November ...	29·1	27·9	39·6	40·6	21·7	34·0	40·8	13·6
December ...	26·2	24·1	34·9	37·4	17·2	28·2	37·0	6·3
Year	35·2	33·1	44·8	44·8	31·3	42·7	45·3	26·3
Max.	86·0	78·4	77·9	82·0	73·2	—	83·8	80·2
Min.	—3·1	—6·9	2·3	6·4	—21·3	—	5·5	—51·9

The temperature both monthly and annual for the South-Western stations, Lindesnes, Helliso and Skudenes remarkably resemble the values for Buxton, Derbyshire, as given by Mr. Bayard in *Quar.Jour. R.Met.Soc.*, xviii., 225.

Bulletin Mensuel de l'Observatoire Météorologique de l'Université d'Upsal. Année, 1895, par Dr. H. HILDEBRAND HILDEBRANDSSON. Upsal, small folio, 74 pp., 1895–96.

ANOTHER collection of tables, good in their way, but without a word of introduction, or description of the instruments or of their positions, and without a single figure relative to the relation of the values given in the book to those of previous years.

As this volume deals with 1895, we have taken out the figures for the same period as dealt with by M. Lancaster, and give the summary in exactly the same form as those on page 41—

Period—January 27th to February 17th, 1895.

Station.	Altitude. Feet.	Mean Max.	Mean Min.	Mean of Extremes	True Mean.	Absolute Min.
Upsala	...	16°0 ..	—0°4 ...	7°8 ...	9°1 ...	—19°1

This shows that Upsala was about 11° colder than Brussels and about 17° colder than London. It would be a comfort if we could either import some Upsala builders, or send some of ours over there. We should probably hear little afterwards respecting burst waterpipes *et id genus omne*.

Beiträge zur Kentniss des tropischen Regens, von J. WIESNER. [Sitzungsb. d. k. Ak. d. Wissens in Wien]. 8vo, Vienna, 1895, 38 pages.

HERR WIESNER spent part of 1893 and 1894 at Buitenzorg in Java, occupied chiefly with botanical researches, part of which led to his studying the mechanical effect of rain on plants and flowers. As the mean yearly rainfall at Buitenzorg is 176 inches, almost exactly that at The Stye, it was evidently a suitable place for his research.

If, as we presume, Herr Wiesner is a botanist, it is rather strange that he should be, as we think that he is, the first to give us details of tropical rains. Millions of observations of rainfall have been made in the tropics, and yearly means are available for probably 1,000 stations, but for details of hourly or minutely fall, the search would be a weary and nearly profitless one.

Herr Wiesner put up a 12-inch glass funnel to collect the rain and ran it into a calibrated tube, reading off the time by a stop watch, and he also made observations by ascertaining the area of porous paper wetted by respective raindrops. He seems somewhat unhappy at discord between his record and that by the local observer, but as Herr Wiesner took no observations at night, and his "day" began at 6 a.m., agreement would be impossible.

He gives details for nine rains and we extract the heaviest :—

			Total. in.	Rate per hour. in.
(1) 1893.....	Dec. 9.....	2.40 to 2.50 p.m.	0·04	0·22
(2) ,, ...	,, 13.....	3.5 to 3.10 p.m.	0·02	·18
(3) ,, ...	,, 16.....	8.57 to 9.2 a.m.	0·07	·87
(4) ,, ...	,, 23.....	About 3 p.m.	—	1·24
(5) ,, ...	,, 25.....	,, ,, ...	—	3·91
(6) ,, ...	,, 27.....	,, 5 p.m.	— ...	·12
(7) 1894.....	Jan. 6.....	7.12 to 7.24 a.m.	0·03	·29
(8) ,, ...	,, 8	7.26 to 7.33 a.m.	0·004	·05
(9) ,, ...	,, 8.....	About noon.....	—	5·36

Unfortunately measurements (4) to (6) and (9) do not give duration, which is all-important; but as far as we can ascertain, none of these measurements approach the intensity observed at Camden Square in 1878, when [*Brit. Rain.*, 1878, p. 79] we had—

Time.	Total. in.	Rate per hour. in.	Time.	Total. in.	Rate per hour. in.
30 seconds ...	·10 ...	12·00	3 minutes.....	·40 ...	8·00
1 minute	·17 ...	10·20	4 ,, ...	·47 ...	7·05
2 ,, ...	·32 ...	9·60	5 ,, ...	·56 ..	6·72

SUPPLEMENTARY TABLE OF RAINFALL, MARCH, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	3·69	XI.	Lake Vyrnwy	7·62
,,	Birchington, Thor	1·85	,,	Corwen, Rhug	4·41
,,	Hailsham	2·80	,,	Carnarvon, Cocksidia ...	...
,,	Ryde, Thornbrough	3·35	,,	I. of Man, Douglas	4·17
,,	Emsworth, Redlands ...	3·26	XII.	Stoneykirk, Ardwell Ho.	2·84
,,	Alton, Ashdell	4·32	,,	New Galloway, Glenlee	7·85
III.	Oxford, Magdalen Col..	2·32	,,	Lilliesleaf, Riddell	2·56
,,	Banbury, Bloxham	2·32	XIII.	N. Esk Res. [Penicuick]	2·95
,,	Northampton, Sedgebrook	2·70	,,	Edinburgh, Blacket Pl..	1·59
,,	Alconbury	1·98	XIV.	Glasgow, Queen's Park..	4·21
,,	Wisbech, Bank House...	2·57	XV.	Inverary, Newtown	10·22
IV.	Southend	2·62	,,	Oban, The Corran	8·45
,,	Harlow, Sheering..... ...	3·72	,,	Islay, Gruinart Schools..	7·05
,,	Colchester, Lexden	2·77	XVI.	Dollar.....	4·53
,,	Rendlesham Hall	2·82	,,	Balquhidder, Stronvar...	8·79
,,	Diss	...	,,	Ballinluig	2·30
,,	Swaffham	3·73	,,	Dalnaspidal H.R.S.....	6·26
V.	Salisbury, Alderbury ...	3·59	XVII.	Keith H.R.S.....	2·50
,,	Bishop's Cannings	3·58	,,	Forres H.R.S.	..
,,	Blandford, Whatcombe .	3·78	XVIII.	Fearn, Lower Pitkerrie..	1·20
,,	Ashburton, Holne Vic...	8·03	,,	N. Uist, Loch Maddy ...	6·42
,,	Okehampton, Oaklands.	5·45	,,	Invergarry.....	9·01
,,	Hartland Abbey	3·05	,,	Aviemore H.R.S.	3·00
,,	Lynmouth, Glenthorne.	4·83	,,	Loch Ness, Drumnadrochit	3·30
,,	Probus, Lamellyn	3·15	XIX.	Invershin	2·95
,,	Wellington, The Avenue	3·11	,,	Scourie	5·25
,,	Wincanton, Stowell Rec.	3·85	,,	Watten H.R.S.....	2·99
VI.	Clifton, Pembroke Road	3·40	XX.	Dunmanway, Coolkelure	7·00
,,	Ross, The Graig	2·24	,,	Cork, Wellesley Terrace	2·84
,,	Wem, Clive Vicarage ...	2·39	,,	Killarney, Woodlawn ...	6 54
,,	Cheadle, The Heath Ho.	3·94	,,	Caher, Duneske	3·50
,,	Worcester, Diglis Lock	2·31	,,	Ballingarry, Hazelfort...	4·11
,,	Coventry, Coundon	2·26	,,	Limerick, Kilcornan ...	4·54
VII.	Ketton Hall [Stamford]	2·08	,,	Ennis.....	...
,,	Grantham, Stainby	1·67	,,	Miltown Malbay	6·74
,,	Horncastle, Bucknall ...	2·19	XXI.	Gorey, Courtown House	2·22
,,	Worksop, Hodsck Priory	1·76	,,	Athlone, Twyford	4·69
VIII.	Neston, Hinderton	3·06	,,	Mullingar, Belvedere ...	5·44
,,	Southport, Hesketh Park	3·63	,,	Longford, Currygrane...	4·30
,,	Broughton-in-Furness ...	7·37	XXII.	Woodlawn	4·75
IX.	Ripon, Mickley.....	3·12	,,	Crossmolina, Enniscoe ..	6·90
,,	Melmerby, Baldersby ...	2·41	,,	Collooney, Markree Obs.	5·41
,,	Scarborough, Obs.	2·42	,,	Ballinamore, Lawderdale	6·01
,,	Middleton, Mickleton ...	3·68	XXIII.	Lough Sheelin, Arley...	4·48
X.	Haltwhistle, Unthank...	4·73	,,	Warrenpoint.....	4·53
,,	Bamburgh	1·84	,,	Seaforde..	3·43
,,	Keswick, The Bank.....	7·96	,,	Belfast, Springfield	4·99
XI.	Llanfrechfa Grange	4·33	,,	Bushmills, Dundarave..	3·54
,,	Llandovery	5·40	,,	Stewartstown	3·77
,,	Castle Malgwyn	4·18	,,	Killybegs	8·65
,,	Builth, Abergwesyn Vic.	10·39	,,	Lough Swilly, Carrablagh	6·22
,,	Rhayader, Nantgwillt ...	8·00			

MARCH, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	3·20	+ 1·59	·53	17	25	65·2	22	29·4	15	2	12
II.		Maidstone (Hunton Court)...	2·11	+ ·61	·41	7	10	...	...	...	...	...	...
,,		Strathfield Turgiss	...	...	...	...	...	...	...	...	...	...	...
III.		Hitchin	3·08	+ 1·74	·46	20	28	63·0	22	30·0	14*d*	6	...
,,		Winslow (Addington)	2·50	+ ·78	·50	17	26	64·0	22*a*	26·0	15	6	12
IV.		Bury St. Edmunds (Westley)	3·78	+ 2·23	·64	17	26	60·0	22	32·0	13*e*	2	...
,,		Norwich (Brundall)	3·02	...	·55	28	26	65·6	22	29·2	13	4	12
V.		Weymouth(LangtonHerring)	2·72	+ ·82	·66	17	26	59·0	22	32·0	30	1	...
,,		Torquay (Cary Green)	3·42	...	·62	20	23	57·1	11	34·0	4	0	4
,,		Polapit Tamar [Launceston]..	4·69	+ 2·16	·91	7	23	58·0	23	26·8	19	3	3
VI.		Stroud (Upfield)	2·71	+ ·52	·33	2, 17	23	62·0	24	32·0	18*f*	3	...
,,		ChurchStretton(Woolstaston)	3·09	+ ·96	·41	2	24	61·0	24	31·0	30	4	15
,,		Tenbury (Orleton)	3·12	+ 1·04	·61	20	23	63·0	24	27·2	19	5	5
VII.		Leicester (Barkby)	2·03	+ ·32	·30	7	28	65·0	24	22·0	30	10	22
,,		Boston	1·98	+ ·44	·30	20*h*	18	65·0	23	30·0	10	2	...
,,		Hesley Hall [Tickhill].....	1·55	— ·35	·33	13	16	67·0	27	26·0	31	7	...
VIII.		Manchester(PlymouthGrove)	3·89	+ 1·67	·76	7	23	59·0	24	29·0	18	3	6
IX.		Wetherby (Ribston Hall) ...	2·37	+ ·31	·53	13	11	...	...	...	...	...	...
,,		Skipton (Arncliffe)	9·87	+ 4·77	1·44	2	24	..	...	...	...	...	...
,,		Hull (Pearson Park).	2·40	+ ·35	·75	13	20	65·0	25	25·0	13	9	12
X.		Newcastle (Town Moor)	2·45	— ·18	·90	13	16	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	19·28	+ 8·78	2·07	2	24	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	5·25	+ 2·27	·65	7	28	...	...	...	...	...	...
,,		Haverfordwest	3·62	+ ·38	·49	6	29	55·7	25	27·8	19	1	10
,,		Aberystwith (Gogerddan) ...	5·85	+ 2·87	1·82	7	27	60·0	24	...	...	...	...
,,		Llandudno.....	4·11	+ 2·03	·83	7	23	55·5	17	33·4	15	0	...
XII.		Cargen [Dumfries]	4·56	+ 1·26	·64	2	19	55·0	25	28·0	19*e*	7	...
,,		Jedburgh (Sunnyside).....	2·70	+ ·74	·50	21	14	59·0	25	26·0	12*g*	11	...
XIV.		Colmonell	5·03	...	·64	7	22	59·0	22*b*	27·0	18*h*	...	...
XV.		Lochgilphead (Kilmory).....	8·78	+ 4·32	1·25	7	28	...	...	24·0	3	10	...
,,		Mull (Quinish).....	7·47	+ 3·63	·85	7	27	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·90	— ·07	·50	3, 4	15	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·15	— 1·25	·20	15	16	57·0	31	27·3	4	9	...
XVII.		Braemar	2·33	— ·31	·32	19	20	54·1	25	23·0	30	16	25
,,		Aberdeen (Cranford)	2·30	...	·40	7	23	58·0	31	24·0	3	11	..
XVIII		Strathconan [Beauly]	8·10	+ 3·78	1·54	2	18	...	...	...	...	...	...
,,		Glencarron Lodge.....	11·79	...	1·15	24	28	54·0	25	25·0	14	13	...
,,		Cawdor [Nairn]	2·22	+ ·18	·37	5	17	...	...	...	...	...	...
XIX.		Dunrobin	2·82	+ ·57	·42	10	21	56·0	31	28·8	14	9	...
,,		S. Ronaldsay (Roeberry).....	3·09	+ ·55	·37	15	24	53·0	25	30·0	7, 13	5	...
XX.		Darrynane Abbey.....	5·58	...	·70	3	29	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	2·36	— ·54	·25	26	24	58·0	7*c*	30·0	19	3	...
,,		O'Briensbridge (Ross)	5·01	...	·51	7	22	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	...	...	..	..	...	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	3·31	+ 1·30	·50	17	23	58·5	24	34·1	27	0	8
XXII.	IRELAND.	Ballinasloe	4·37	+ 1·74	·59	3	28	55·0	9, 24	29·0	19	7	...
,,		Clifden (Kylemore)	9·76	...	1·39	23	30	...	...	...	...	...	...
XXIII		Waringstown	3·42	+ 1·07	·45	2	23	60·0	24*b*	28·0	18*i*	13	19
,,		Londonderry (Creggan Res.).	5·32	+ 2·59	·68	3	27	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·36	+ 1·85	·66	7	26	54·0	8, 22	28·0	18	6	17

+Shows that the fall was above the average ; —that it was below it.

a—and 24. *b*—and 25. *c*—and 8, 11, 22. *d*—and 18, 29. *e*—and 30. *f*—and 29, 30. *g*—and 23. *h*—and 29. *i*—and 26.

METEOROLOGICAL NOTES ON MARCH, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

HITCHIN.—The wettest March since 1851, with the greatest number of wet days ever recorded.

ADDINGTON.—The rainfall has been only twice exceeded during 25 years, and no other March has had rain on so many days. On the 4th the bar. was unusually low, 28·783 in. (cor. and red.) at 9 a.m. Dense fog on the morning of 23rd. S showers and L on 3rd. T on 22nd. H, S and sleet on 28th and 29th.

BURY ST. EDMUNDS, WESTLEY.—The wettest month of March registered since observations commenced on January 1st, 1857. March, 1888, 3·35 in. and March, 1890, 3·06 in. are the only other instances with more than three inches. A mild month. Vegetation very forward. T on 4th. TS on 22nd.

NORWICH, BRUNDALL.—The mildest March since 1882, and the wettest since 1888, when the month's total was nearly the same. At the close of the month vegetation was not so forward as in 1882, when there was more sunshine. S.W. gales on 3rd, 6th and 16th, and N.W. on 27th. H on 4th, 5th, 16th and 29th. Severe but distant TS on evening of 22nd. Slight distant TS on evening of 24th. Solar halo on 26th.

WEYMOUTH, LANGTON HERRING.—The mean temp. at 9 a.m., 46°·2, is the highest of the last 25 Marches, and 4°·6 above the average. Very strong gales blew on the 2nd, 3rd and 4th, and again on the 26th. Solo halos were observed on the 10th and 26th. Fogs on the 7th and 17th. Rainfall of the first 3 months of the year 4·18 in., or 61 per cent. of the average.

TORQUAY, CARY GREEN.—Rainfall 1·05 in. above the average. Mean temp. 47°·8, or 4°·1 above the average. Duration of sunshine 117 hours 20 minutes, being 32 hours below the average; 3 sunless days.

POLAPIT TAMAR [LAUNCESTON].—Generaly warm, but rough and stormy, and unusually free from cold east winds. A very wet month, the total being the highest for March during 16 years, the previous highest being in 1888, when 4·53 in. fell. H, S and T on 3rd. H on 4th. Thick fog early on 23rd. Stormy with H on 26th, 27th and 28th.

STROUD, UPFIELD.—T and L between 4 and 5 a.m. on 2nd; L seen at 6 p.m. on 24th. S.W. gales on 3rd, 14th and 26th.; N.W. gale on 15th. Slight S shower on 29th.

WOOLSTASTON.—A stormy month, with constant scuds of S and H; a wild gale on the night of the 2nd. Mean temp. 44°·4.

TENBURY, ORLETON.—A very warm, damp month. The warmest March, with the exception of 1868, in the last 35 years, and the wettest since 1886. Mean temp. nearly 4° above the average. Chiffchaff heard on the 19th. Cherry, plum and damson trees coming into blossom at the end of the month. S on the 13th and 16th. T and L on 24th. Aurora borealis on the 4th.

LEICESTER, BARKBY.—Considerable wind at times. R every day but three. Mean temp. 43°·1.

MANCHESTER, PLYMOUTH GROVE.—Very mild for the season, and no cold easterly winds. The rainfall is the greatest in March for 29 years. Thick fog on 23rd and 25th. On the 24th a beautiful display of sheet lightning. On the 28th a slight fall of S. Mean temp. 45°.

WALES.

HAVERFORDWEST.—Another month of constant R, although the quantities were small. The month commenced with boisterous weather and heavy gales, with the barometer below 29 inches for more than 36 hours, the gale lasting a week. The month throughout was mild for March, with only one night of frost

in the screen. The last week was very stormy and colder; the last two days calm and fine. Blackthorn in full blossom, chestnut almost in full leaf, hedgerows quite green. Trees of every kind very forward; every appearance of a very early spring.

ABERYSTWITH, GOGERDDAN.—Very wet throughout the month and very mild, but very little sunshine.

SCOTLAND.

CARGEN [DUMFRIES].—Constant atmospheric changes have been the order of the month, but cloudy unsettled weather generally prevailed. Bar. pressure has been very fluctuating, and the mean for the month 29·556 in. has only in four years been lower since 1860. Temp. is 1°·6 above the average, the lowest reading 28° being the highest minimum in this month since 1882, when frost was never registered. L was seen on the night of 3rd; an inch of S fell on 14th; brilliant aurora was seen on 29th. Westerly wind prevailed on 17 days, and a pretty stiff breeze from N.W. was experienced on 6th. The wet weather delayed the sowing of corn until the last two days of the month, but farm work generally is well advanced. Vegetation is very forward pastures looking exceptionally fresh and green.

JEDBURGH.—The weather was on the whole agreeable. The night temp. was low but that of the day was high. Though a good deal of R fell there was much wind which kept the ground dry and made it fit for sowing. S on the 13th, H T and L on 21st.

COLMONELL.—Mean temp. 44°·1. S showers on 3rd. Strong gale on 16th.

LOCHGILPHEAD, KILMORY.—An exceptionally wet and stormy month for March.

MULL, QUINISH.—An excessively wet and unsettled month the R being almost double the average. Frost on the 12th and 14th, but not severe. Vegetation unusually forward.

BRAEMAR.—A very excellent month. Duration of sunshine 130 hours 20 minutes.

ABERDEEN, CRANFORD.—The month was very dull and cold.

S. RONALDSAY, ROEBERRY.—A wet cold month, Mean temp. 41°·4. A beautiful display of Aurora on the evening of 4th, finest between 10 and 11 o'clock.

IRELAND.

DARRYNANE ABBEY.—A wet cold month, the wettest March registered between 1870–79 and 1890–96. The next wettest was March 1877, when 4·81 in. fell on 22 days.

WATERFORD, BROOK LODGE.—Laurels and blackthorn had a remarkable amount of blossom on them this season. The frost on the 18th and 19th injured the early potatoes which were very forward. H on 1st and 28th, S on 3rd. Thick frosty fog on 22nd.

O'BRIENSBRIDGE, ROSS.—A bad month and the heaviest R since 1882 when 5·76 in. fell.

DUBLIN.—A changeable, wild and very rainy month. Temp. although on the whole markedly above the average was very unstable, and some sharp fluctuations were observed. The mean temp. 46°·1 is 3°·0 above the average. The atmosphere was more or less foggy on 6 days. High winds were noted on 17 days reaching the force of a gale on 10 occasions, S or sleet occurred on 3 days and H fell on 4 days. A solar halo was seen on the 27th and a lunar halo on the 23rd. Brilliant aurora borealis occurred on the night of the 4th.

WARINGSTOWN.—*Correction for February.* In the return for last month ·15 in. measured on March 1st was omitted, leap year being forgotten. The total R should be 1·41 in. and difference from average −1·04.

OMAGH, EDENFEL.—The wettest March since 1868. Let us hope that it will be equally prophetic of the splendid year that then followed.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXIV.] MAY, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

THE WORST GALE OF THE 19TH CENTURY IN THE ENGLISH MIDLANDS.

IT is remarkable that the gale of March 24th, 1895, has not been completely discussed. Short papers were written respecting it for local scientific societies in Northamptonshire and Norfolk by the Rev. H. A. Boys and Mr. A. W. Preston respectively, and the same gentlemen sent very graphic letters, which, with one from Miss Stanton, of Stroud, were printed in this Magazine for April, 1895; but there is not, to our knowledge, any full record of it in the publications either of the Meteorological Office or of the Royal Meteorological Society.

In preparing the observers' notes for publication in *British Rainfall*, 1895, our attention was recalled to the subject, and we hesitated for a moment and considered whether the additional unutilized data which we possessed should be inserted in that volume, but as it was a storm of wind, not rain, it appeared more appropriate to print it in these pages. We therefore give in the present number part of a list of damage which we believe to be without parallel since 1703, and in the next number we hope to complete it, and to offer some general remarks upon the subject.

It is a curious coincidence that the day of the week, as well as the day of the year were identical with that of the disaster to the "Eurydice,"* and the hour of the day approximately the same :—

"Eurydice,"	Midland Gale,
Sunday, March 24th, 1878.	Sunday, March 24th, 1895.

Counties arranged as in *British Rainfall*, places grouped from South to North.

MIDDLESEX.

James Street, Commercial Road, E.—Some houses had been partly pulled down, an outside wall was blown over and killed three persons.

Hyde Park, London.—A large oak blown over about 4 p.m.

Earl's Court.—Several erections damaged.

* *Met. Mag.*, 1878, pp. 33, 57.

MIDDLESEX—(*continued*).

Tottenham Court Road.—A shop window at the corner of Chenies Street was wrecked. The glass fell outwards, and as the window faced W.S.W., this looks much like the result of expansion of the air in the shop.

Alperton, Harrow.—A man was blown under a passing vehicle and killed.

BERKS.

Windsor.—Six large elms blown down in the park.

BUCKS.

Newport Pagnell.—Three pinnacles blown off the church tower, one pierced the roof of the nave, and rendered it impossible to hold service. Trees and chimneys have suffered severely.

OXFORD.

Banbury.—Chimney blown down and woman killed.

NORTHAMPTON.*

Easton Neston.—Fearful gale, 2 p.m.

Blisworth—Terrific hurricane, 0.30 to 2.30 p.m.

Fawsley.—Between 1.30 and 2 p.m., thousands of trees, chiefly elms, torn up by roots or snapped off.

Easton Mauduit.—Dangerous hurricane from 1.30 to 2.15 p.m. The very worst from 1.50 to 2 p.m.

Northampton.—A child killed by a falling wall; many roofs damaged, three churches and five chapels injured.

Althorp House—Terrific gale between 1 and 2 p.m., especially just before 2 p.m. The gale lifted the lead of the roof over two of the high chimneys.

Boughton House.—About 1,000 trees down.

West Haddon.—Violent hurricane between noon and 3 p.m.

Wellingborough.—The lowest estimate for the damage in this town is £5,000. The bell turret at St. Barnabas blown on to the schoolroom, the Waterworks' chimney and that of Messrs. Dulley, each about 40 ft. high, were blown down, and there was damage in nearly every street. In the fens, hardly a straw stack is left.

Hargrave.—Phenomenal hurricane, 1.30 to 2.30 p.m.

Raunds.—The streets were strewn with thatch, slates, ridge-tiles and chimney pots; a window was blown in at the Post Office, and the wooden pavilion in the cricket field was blown to atoms.

Kettering.—During the gale, about 2 p.m., the town was a veritable pandemonium, the streets being thickly strewn with tiles and chimney pots. A factory chimney was blown down, and a horse buried in its stable. The neighbourhood is thickly wooded, and has suffered tremendously; at *Warkton* alone, 200 trees were down. All the roads out of the town were impassable on account of fallen trees.

Thrapstone.—Much damage to houses and trees.

Welford.—Gale at its height from 1 to 3 p.m.

Aldwincle.—Gale at its height from 1.30 to 3 p.m.

* See *Met. Mag.*, April, 1895.

NORTHAMPTON—(*continued.*)

Oundle.—The damage is enormous; nearly every house suffered, and the streets were littered with wreckage from end to end. Six large chimneys (including that at the gas works) went down about 2 p.m., and unnumbered private ones. The roof of the cricket club pavilion was carried into an adjoining field. At *Polebrooke*, the top of the spire, and the weathercock fell through the roof into the church.

Weldon.—Full force of gale from 1.45 to 2.15 p.m.

Deene, Kingscliffe.—Hundreds of trees uprooted, and many houses damaged.

Apethorpe, Wansford.—Considerable damage to trees, ricks, and thatched cottages.

Kingscliffe.—Many chimneys down, in fact, few houses in the place entirely escaped.

Peterborough.—Few cities suffered more than Peterborough; the gale was heaviest shortly before 2 p.m. and began to subside about 3. Three pinnacles on the west front of the cathedral were blown down, and the roof was considerably damaged. The Deanery has a particularly wrecked appearance, the two chimney stacks on the wing nearest the cathedral both going down, and one of them taking part of the gable with it. A pinnacle was taken off St. John's Church, one window was blown in at Christ Church, and one at the Baptist Chapel. Several factory chimneys were overturned, but the special feature at Peterborough was the wreckage of private houses, not mere damage to roofs by the falling of chimney stacks, but the frequency with which gable ends were forced in or out, and the consequent wreckage of furniture; *e.g.*, in Gladstone Street a house had only the ground floor intact, and after the roof and wall of the front bedroom had gone, the wind blew a large wardrobe into the street. A wood and iron stable in the rear of Mrs. Bird's residence, on the London Road, was lifted up, and carried bodily into the grounds of Councillor Crawley's house, and then the wind ripped off the side and tore it into pieces.

Milton Park, Peterborough.—Between 300 and 400 trees blown down.

Eye.—A very large portion of the roof of the church was blown off; at least 50 houses were damaged, several gable ends were blown in; it was the fiercest gale remembered.

Easton.—Several houses unroofed, and the rectory and the Wesleyan Chapel each lost a chimney.

Barnack.—Nearly every house damaged and many hundred trees uprooted, one in falling killed a pony.

HUNTINGDON.

St. Ives.—Great damage about 2.30 p.m.

Godmanchester.—Scarcely a house or building escaped damage, the gable of the old Grammar School fell outwards; the damage is estimated at hundreds of pounds.

Huntingdon.—Six boys were standing under the shelter of a fence watching the tiles being stripped off the houses, when an elm tree was blown on to them, which killed one and broke the legs or arms of all the others. Nearly every house in the town was damaged, a finial was blown off the church and a tower window blown in. The roads out of the town were all blocked by fallen trees. *Buckden* church spire was blown down.

Ramsey.—Scarcely a house has escaped damage. Many chimneys and stacks overturned, and the roof of the waiting room at the railway station carried away.

CAMBRIDGE.

Cambridge.—About 2 p.m., chimney damaged in St. Andrew's Street. Abbey Church, Newmarket Road, partly unroofed. About 2.10 p.m., a chimney stack was blown over at *The Spring, Chesterton.* About 2.20 p.m., the top 30 feet of a brewery chimney was blown down. At 2.30 p.m., a chimney was blown down in York Street. About 2.50 p.m., the Sturton Town Hall was partly demolished.

Bottisham.—Many gables and chimneys, and scores of trees, blown over between 1 and 3 p.m.

Swaffham Bulbeck.—Great damage about 2.15 p.m.

Swaffham Prior.—Windmill smashed between 2.30 and 3.20 p.m.

Newmarket.—Great damage, especially to tall chimneys and to trees.

Waterbeach.—Great damage between 2 and 4 p.m.

Cottenham.—Unprecedented gale from 2 to 3.15 p.m., very few buildings escaped damage.

Willingham.—Nearly every building damaged between 2 and 3 p.m.

Soham.—No one remembers such a gale as occurred between 2 and 3 p.m. The principal street was covered with shutters, slates, tiles, and thatch; the pinnacle of the church fell through the roof into the nave, smashing a seat; several cottages had one end blown out, while barns and windmills went down in all directions.

Haddenham.—Great damage between 2.15 and 4 p.m., five barns completely wrecked.

Witchford.—One barn was turned over bodily, others lost their roofs, and about 150 feet of tiling was stripped off the church.

Ely.—Terrific gale, 2 to 3.30 p.m., the cathedral did not suffer seriously, though lead on the roof was rolled up, several windows were broken, and a pinnacle was overturned. The workhouse, brewery, and several private houses much damaged.

Chatteris.—Terrific storm from 2.15 to 3.30 p.m. Most of the large chimneys are down, also a new factory 150 feet long, and the turrets of each of the cemetery chapels, while hovels and sheds are down by the score. The soil was blown up from the Acre Fen in tremendous clouds, having the appearance of black smoke from a gigantic fire. Tons of straw are floating down the river in such masses as to impede navigation.

Littleport.—Much damage to chimneys and roofs.

Manea.—Great storm between 2 and 3.15 p.m.

Benwick.—The air was so filled with black earth that one could only see a few yards. The church, chapel, and school were all damaged.

Wimblington, March.—Church much damaged in afternoon.

March.—A terrific gale passed between 2 and 3 p.m.; the streets were covered with broken tiles, and hardly a house escaped. Seven railway carriages were on one siding, and one truck on another, both sets were blown along to the points, where a collision occurred. Baptist Chapel blown down and the Wesleyan one much damaged.

Whittlesea.—Serious destruction, every third or fourth house damaged.

Wisbech.—Very great damage, scarcely a house escaped. There is supposed to have been no such gale since 1703; its intensity did not last half-an-hour, and was between 2.10 and 3 p.m.

ESSEX.

Coggeshall.—Cottage damaged by the fall of a large poplar across it.

SUFFOLK.

Lowestoft.—The windows of two shops were blown in, houses were unroofed and trees blown down. To enumerate all the damage would be to give a list of one-third of the houses in the town.

Bury St Edmunds.—Two chimneys blown over at the hospital, about 3 p.m., and several pinnacles off the church.

NORFOLK.*

Denver.—Church very seriously damaged, the spire having fallen through the roof.

Yarmouth.—Much damage to house property, several houses unroofed, and the tramroads so blocked by fallen trees that traffic was suspended. The Parish Church, Post Office and Customs House are all damaged. The scene in Middlegate Street was remarkable, there are about 200 houses, and scarcely one had escaped injury, and there was hardly a square foot in the street not covered by some kind of wrekage. At 3.40 p.m., a roll of lead was blown across S. Howard Street, at about 25 ft. above the ground, it struck and demolished an upper window, and then fell back on to the pavement below. At Messrs. Brown's Yards, slates from neighbouring houses were imbedded an inch deep in the doors.

Norwich.—Part of Norwich Workhouse, consisted of three stories: (1) a basement; (2) the dining hall; (3) the chapel. The master, during the gale, was watching the roof, and saw it lifted bodily about 4 ft. and then dropped, when it crashed through the chapel carrying the floor of it, and of the dining room, into the basement, thus wrecking the entire building. In *Mill Hill Road*, the roofs of two cottages with the rafters and tiles thereon were carried across the road (more than 30 ft.). In *College Road* there was a stack of timber in readiness for house building, nearly the whole stack (in 12 ft. and 16 ft. lengths) was swept up into the air and carried over the Unthanks Road allotments.

St. Faith's (Norwich).—Scarcely a house for miles round escaped damage, the trees were down in all directions, and nearly every rick was either stripped of its thatch or blown away entirely. It is estimated that the Abbey Farm lost 6,000 tiles.

Lakenham.—Roads strewn with tiles and broken trees, walls and gates blown down, and roofs stripped and broken.

Thorpe Hamlet.—Terrible havoc; one little street (Harbour Road) was so strewn with tiles that it looked as if paved with them.

North Heigham.—This district suffered terribly, the whole place looked as if it had been bombarded, tiles, slates and brick ends were lying about in cartloads, the gables of several houses fell out, and scores were unroofed.

Acle.—Many houses, and also the church, damaged, and ricks blown away.

Lower Hellesdon.—Just before afternoon service, a tree was blown across the road which barred access to the church; this was sawn up and service commenced, but in a few minutes there was so much noise from falling slates, gutters, coping stones and broken windows that all had to leave. The roof of Sir H. Bullard's malthouse was lifted bodily and dropped on the ground below.

* See *Met. Mag.*, April, 1895.

NORFOLK—(*continued*).

Swaffham.—Nearly every house suffered severely. The chimney shaft of the brewery fell across the premises, and destroyed about 2,000 gallons of beer.

Walsoken.—Hardly a house escaped, and many fruit trees were uprooted.

South Walsham.—Furious gale from W.S.W. 3 to 3.30 p.m.; although the trees were without leaves, very large numbers were overthrown, and many houses and ricks damaged.

Beeston.—Between here and *Sprowston* the road was strewn with hay, pedestrians reported it to be in places knee deep.

E. Dereham.—Great damage to roofs and chimneys about 3 p.m., one thatched roof entirely carried away.

Worstead.—A window of the church blown in during afternoon service.

North Walsham.—Hundreds of trees blown down, ricks and chimney stacks overturned, the church steeple damaged and lead ripped off the roof. The gas holder (capacity 35,000 cubic feet) at the Gas Works, which was about half full, was so blown to one side that the pillars were drawn nearly off their brick bases, and the whole apparatus will have to be taken down and re-erected.

Lynn.—The damage is estimated at several thousand pounds, nearly every building has suffered. Several factory chimneys are down, nearly all the roof has gone off the Corn Exchange. 3,000 trees reported to be down on the *Castle Rising Estate.*

Sandringham.—Nearly 2,000 trees blown down, also about 30 yards of the garden wall.

Wells.—Many trees down, and the streets strewn with tiles and chimney pots.

SOMERSET.

Bath.—St. Michael's and St. Bartholomew's Churches both damaged, soon after 1 p.m., as well as many private residences.

GLOUCESTER.

Bristol.—Trees blown down, attic windows blown in, tiles and chimney stacks blown into the streets, and two children killed. The police cautioned persons against attempting to cross Princes Street Bridge, a four-wheel cab attempted it, and was blown over. The wind actually lifted the heavy planks in the timber yards and whirled them in the air, carrying some of them a considerable distance. The storm was worst about 0.45 p.m.

Gloucester.—Trees uprooted, roofs blown off, a wall blown out at a chapel, and a tall chimney blown down at the marble works.

HEREFORD.

Whitbourne (near *Worcester*).—An iron mission room was so forced out of shape that it could not be used.

SHROPSHIRE.

Bridgnorth.—Many houses unroofed, and hundreds of trees uprooted.

Stirchley, Coalport.—Church seriously damaged.

Ironbridge.—Part of the roof of the Wesleyan Chapel was blown in, and fell upon the organ, two windows were blown out at the minister's house; many ordinary chimneys were blown down, and two tall ones at the brick works.

Newport.—Two large chimney stacks blown over, each fell through the roof into the rooms below.

STAFFORDSHIRE.

Handsworth.—Top of spire at the Baptist Church blown off.

STAFFORDSHIRE—*(continued).*

Bilston.—The Town Hall roof, and the G. W. R. station, considerably damaged, as was also much small property.

Wolverhampton.—St. Peter's Church lost three out of its four pinnacles, and many factory and private chimneys demolished. The total damage was put at £15,000.

Walsall.—Two stacks of chimneys upset at the hospital; one fell across a ward and brought down the whole building, carrying the patients and nurses into the board room below. Very serious injury and suffering resulted.

Tamworth.—Great destruction of trees south of this town. Roads blocked.

Lichfield.—Part of the parapet of the Lady chapel was blown down, and ths roof of the cathedral stripped of an unusual number of slates. Many housee suffered either by broken roofs or overturned chimneys.

WORCESTERSHIRE.

Spetchley Park, Worcester.—Nearly 50 large elms overturned, and the contents of several stackyards in the neighbourhood scattered.

Worcester.—The roof of a tannery was lifted bodily, a pinnacle was blown off the cathedral, and much damage done to private property.

Droitwich.—The mischief here was chiefly among the trees, hundreds of which have fallen. The borough surveyor, with men and horses, were occupied all the afternoon removing seven large trees which had fallen across roads in the borough. Some damage was done to the roof of St. Augustine's Church.

Headless Cross, Tardebigge.—Wesleyan Chapel completely wrecked.

Bromsgrove.—All Saints' Church lost a pinnacle, which damaged the roof; several of the crest tiles were also carried away. The storm was worst about 1.15 p.m., and many chimney stacks fell and broke through the roofs into the upper rooms. A hayrick has disappeared, it is supposed to have gone into an adjacent pool. Every road was blocked by fallen trees, but by Monday the main roads were cleared.

WARWICKSHIRE.

Sutton Coldfield.—The Parish Church, Congregational Church and Wesleyan Chapel were all damaged; many trees were down, and two roofs damaged by the fall of chimney stacks.

Stratford-on-Avon.—Nearly all the roads blocked by prostrate trees, and roofs damaged in all parts of the town. Roof of goods shed at railway station lifted off.

Henley-in-Arden.—Dozens of trees uprooted, and several roofs damaged by falling chimney stacks.

Warwick.—The Gateway Chapel was much injured, also two houses in Market Square, and several in *Coten End* and *Emscote.*

Leamington.—Chimney stack overturned and broke through two floors to the dining room, where it injured three ladies; they were taken to the hospital, where a similar but less serious accident had occurred.

Kenilworth.—Hundreds of trees uprooted, the bell turret at the National Schools, and a wall at the Abbey Hotel upset.

Rugby.—Hundreds of trees down, including 17 in the School Close.

Coventry.—Many trees uprooted, and the advertisement hoardings carried away.

Bedworth.—Innumerable trees uprooted, a wooden shed about 180 feet by

WARWICKSHIRE—(*continued*).

20 feet was blown over, and a house in King Street destroyed ; a window was blown in in High Street, and several walls and stacks were overthrown.

Birmingham.—The worst of the storm was between 1.30 and 1.45 p.m., and the number of houses of which the upper rooms were wrecked by falling chimneys is past all counting ; every 100 yards in any street will prove it, and it will be weeks before all can be repaired. Happily very few persons were in the streets, and most were at dinner downstairs, hence only three deaths have to be recorded, but there were a great many serious wounds. St. Lawrence's Church much damaged.

LEICESTERSHIRE.

Market Harborough.—Much damage in this neighbourhood. The worst case was the residence of Mr. Kennard, on high ground, at *Clack Hill.* The family was at luncheon when the window and surrounding framework was blown in, and they were battling with it, when a great crash told that a double Elizabethan chimney had broken through the roof and wrecked two bedrooms.

Leire.—Many trees down and three cows killed beneath them, several houses unroofed.

Frolesworth.—Farm buildings demolished, and many trees down.

Dunton Bassett, Lutterworth.—Much damage to trees, and at the new vicarage, of which the chimneys had been made the decorative feature, every one was blown over, and broke through the roof.

Broughton Astley.—A perfect tornado from 1.30 to 2 p.m. Trees torn up in great numbers, and many buildings seriously damaged ; a newly-built shed, 120 feet long and roofed with slate, was lifted bodily and carried some feet.

Hinckley.—Isolation hospital blown down, patients had to be wrapped in blankets and laid under hedges for protection.

Stoney Stanton.—Several gable ends demolished and some windows blown in, many chimneys broken, and ridge tiles blown away.

Kibworth.—Much damage both to trees and houses.

Wigston.—Terrific storm from 1 to 3 p.m., many brick walls blown over and houses unroofed.

Enderby.—Great damage, rows of chimney pots were swept away like skittles, roofs were broken through, and the roads blocked with fallen trees.

Oadby, Leicester.—Great destruction of trees.

Aylestone, Leicester.—Two men killed by a falling tree, and a girl by a falling wall. Wrecked roofs are too numerous to be counted, and many gable ends have gone.

Old Knighton—Church so damaged that service could not be held.

Tugby.—Great damage to roofs, chimneys, and sheds.

Skeffington.—Much damage, several roofs lifted off bodily.

Billesdon.—Many trees uprooted, but not so much damage to houses as in adjoining parishes.

Braunstone.—Many trees down, but not much injury to houses.

Leicester.—Chimney stack fell through roof of workhouse, gable end of Clipstone Street Chapel blown in, two factory chimneys fell, and dozens of chimneys and walls damaged and blown down.

Tilton.—The church damaged, and the vicarage lost all its chimneys.

Bagworth.—Several stacks and trees blown over, and much damage done to houses in *Ellistown.*

LEICESTERSHIRE—(*continued*).

Birstall, Leicester.—Many trees and walls down and the roads blocked, house windows blown in, and roofs damaged.

Somerby.—Many trees down, and extensive damage to roofs and chimneys; the roofs of some outbuildings lifted off.

Syston.—Factory chimney, 75 feet high, fell through roof of engine house.

Sileby, Syston.—Many walls and chimney stacks overthrown.

(*To be continued.*)

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, April 15th, at the Institution of Civil Engineers, Westminster, Mr. E. Mawley, President, in the chair.

Mr. W. Ellis, F.R.S., read a paper on the "Mean amount of cloud on each day of the year at the Royal Observatory, Greenwich, on the average of the fifty years, 1841–90," in which he showed that a principal maximum occurs in winter and a principal minimum in autumn, with a secondary, much less pronounced, maximum in summer and a secondary minimum in spring. There is, however, considerable irregularity in the succession of daily values, the differences between which on consecutive days are in numerous cases relatively large. The means for the different months are:—

January	7·41	July	6·68
February	7·41	August	6·49
March	6·95	September	6·25
April	6·57	October	6·83
May	6·50	November	7·05
June	6·59	December	7·43

Mean of the twelve monthly values ..... 6·85

Grouping the observations into five-day means, the principal maximum occurs January 16th–20th = 7·88: the principal minimum is double, August 29th–September 2nd, and September 18th–22nd, both = 6·06: the secondary maximum occurs June 5th–9th = 7·06, and the secondary minimum May 1st–5th = 6·14.

An examination was made into the distribution of days in different months as regards degrees of amount of cloud. Thus days having an amount of cloud between 0·1 and 3·0 were considered as days of little cloud, days with between 3·1 and 8·9 as days of medium cloud, and days with between 9·0 and 9·9 as days of much cloud.

The cloudless days are most numerous in spring and autumn, and least so in winter and summer, though the variation in this respect through the year seems scarcely so great as might have been expected. The days of little cloud are somewhat less numerous in winter as compared with other parts of the year, in which there is little variation, whilst the days of medium cloud are much more numerous in summer than in winter. The days of much cloud are

nearly equal in amount in all parts of the year. The overcast days are much more numerous and nearly equal in amount in the first and fourth quarters of the year, much less numerous in the second quarter, and again less numerous in the third quarter. The distribution of days of different degrees of cloud is altogether very similar in the months of December, January, and February, but in March and October differs very little from the distribution for the year as a whole. Decrease in the number of overcast days as summer is approached is accompanied by a nearly equal increase in the number of days of medium cloud, and by scarcely any change in the number of days of much cloud. That is to say the lesser number of overcast days of summer is supplemented, not by an increase in the number of days of much cloud (rather indeed by a slight decrease), but by increase in the number of days of medium cloud, and some increase in those of little cloud.

The paper concluded with a discussion of the relation between the mean amount of cloud and the duration of bright sunshine.

Mr. E. D. Fridlander, B.Sc., gave an account of observations of the amount of dust in the atmosphere at various places during a voyage round the world in 1894–5. The experiments, which were made with a form of Aitken's pocket Dust Counter, showed that there are often considerable variations in the number of dust particles in a very short space of time. Not only did dust occur in the air of inhabited countries, over the water surfaces immediately adjoining them, and up to an altitude of 6,000 or 7,000 feet amongst the Alps, but it was also found in the open ocean, and that so far away from any land as to preclude the possibility of artificial pollution, and its existence has been directly demonstrated at a height of more than 13,000 feet.

Major H. E. Rawson, F.R.Met.Soc., gave an analysis of the Greenwich rainfall records from 1879 to 1890, with special reference to the declination of the sun and moon.

FOG, MIST, HAZE.

To the Editor of the Meteorological Magazine.

SIR,—At meetings of the Royal Meteorological Society, when reference has been made to fog, &c., there has appeared to be an absence of unanimity as to the meaning attaching to the different words in general use, and it occurs to me that discussion of the subject in the *Met. Mag.* might be useful, even if it led to no final result.

In the hope of starting such a discussion, I have set down my ideas as clearly and simply as I am able, and offer suggested definitions.

When, by fall of temperature or other change, a mass of air becomes incapable of holding in invisible suspension the aqueous

vapour which it contains, a portion condenses into visible particles of water, and forms, in the higher regions of the atmosphere, clouds, and at or near the earth's surface fog or mist.

If the fall of temperature be gradual, the individual particles of water will at first be extremely minute, but by further condensation upon them, or by coalescence, they will increase in size till they become visible individually, and may be seen to fall by gravitation.

In the lower atmosphere the particles fall to the ground before they have time to attain such a size as would justify the name of rain-drops, but in the upper air they fall much greater distances, and have time to grow into rain-drops of all sizes.

This condensation from the air is, I take it, the only fog or mist provided by nature. Man at times adds to it the smoke of large towns, which may modify its effect on instruments and prevent its ready return to the invisible form.

The phenomena so far referred to are all the result of a humid, but perhaps not always a supersaturated, atmosphere.

Over and around towns, during anti-cyclonic conditions, with calm air, the smoke accumulates and causes obscuration; to this condition also the name of fog is popularly applied, though the phenomenon is a purely artificial one, and the water particles of Nature's fog are absent.

FOR DEFINITIONS I would suggest:—

Fog.—An obscuration due to the condensation of aqueous vapour in the atmosphere when the individual particles are too small to be seen with the naked eye.

Mist.—An obscuration due to the condensation of aqueous vapour in the atmosphere when the individual particles are large enough to be seen with the naked eye.

Note.—The addition of town smoke (including smoke from forest or prairie fires, &c.) to either of the above to be ignored.

Smoke-fog.—Town smoke without water particles, either *in situ* or drifting over the country.

Haze.—An obscuration of distant objects, so slight that the cause is not visible to the Observer in the air immediately surrounding him.

These definitions would, I think, interfere as little as possible with ordinary nomenclature, and are in fair agreement with recent dictionaries. They would leave the word fog for the majority of country town and sea fogs, mist for what is now frequently called Scotch-mist, and haze as I believe it is usually understood.

The work of Aitken does not, I think, enter into the question, as it is exceptional for the air near the earth's surface to be so free of dust, or other suitable particles, that aqueous vapour has any difficulty in finding nuclei upon which to condense.

Yours obediently,

F.R.MET.SOC.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, NOVEMBER, 1895.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	46·1	16	32·0	18	52·4	41·5	43·5	88	87·4	25·1	3·17	19	7·2
Malta	78·1	11	55·5	21	73·3	61·4	58·7	82	130·1	51·1	1·79	11	6·6
Mauritius	84·6	28	64·4	5	81·2	69·9	66·1	75	134·7	57·5	2·58	15	5·3
Calcutta	86·6	11*a*	58·4	23	83·5	66·0	64·4	70	147·2	50·0	·00	0	2·0
Bombay	91·2	19	72·3	29	88·3	75·2	70·4	70	142·5	61·6	0·6	2	1·3
Ceylon, Colombo	90·7	27	72·8	30	87·8	74·3	71·3	77	152·0	64·0	5·83	15	4·9
Melbourne	98 7	25	39·0	12	71·6	50·4	47·8	61	147·2	27·8	·25	5	4·8
Adelaide	103·7	24	43·8	8	79·2	54·6	46·4	48	157·0	34·3	·95	3	3·2
Sydney	89·7	7	53·8	5	73·0	60·0	55·0	70	151·6	44·6	2·62	12	5·8
Wellington	73·8	1	42·2	7	62·2	50·0	47·0	71	136·0	32·0	6·00	18	4·9
Auckland	68·0	21	46·0	27	63·7	51·5	48·8	72	134·0	42·0	5·54	22	5·4
Jamaica, Kingston	89·4	2	68·7	25	87·3	70·9	68·8	80	...	...	1·17	11	4·7
Trinidad	...	...	...	...	...	...	...	...	...	...	..	...	...
Grenada	85·8	2	70·2	29	82·6	74·0	70·7	79	156·6	...	14·61	20	6·4
Toronto	59·2	7	13·3	21	43·2	30·6	32·6	83	76·5	8·0	4·27	12	7·4
New Brunswick, Fredericton	63·7	7	6·6	30	46·1	25·5	31·1	76	...	...	9·96	10	6·3
Manitoba, Winnipeg	42·9	17	−21·7	26	26·3	9·4	...	...	...	...	·95	11	6·8
British Columbia, Esquimalt	58·1	15	20·1	5	48·3	38·7	41·8	94	...	...	3·44	19	7·4

a—and 14.

REMARKS.

MALTA.—Adopted mean temp. 65°·8, 4°·0 above the average. Mean hourly velocity of wind 7·8 miles. Average temp. of sea 70°·4. Thunderstorms on 12th 14th and 19th, and Lightning on 8 other days. The mean temp. of the month is the highest on record in 12 years. Rainfall remarkably below the average.

J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·5 above, of dew point 1°·9 above, and rainfall ·64 in. above, their respective averages. Mean hourly velocity of wind 10·1 miles, or 0·8 mile below the average; extremes, 28·1 on 17th, and 0·0 on 11th and 14th; prevailing direction, E.S.E. to E.N.E. T and L on 16th. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms occurred on 10 days. D. G. MANTELL.

Adelaide.—Mean temperature same as average of 38 years, rainfall ·05 in. below the average. C. TODD, F.R.S.

Sydney.—Mean temperature 0°·1 below, humidity 0·7 above, and rainfall ·56 in. below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—On the whole showery during the month, but a few fine days in the middle and at the end. Prevailing wind N.W.; strong on 9th, 10th and 11th, otherwise moderate. Snow on hills on 28th, and sleet on 26th. Mean temp. 0°·4 below, and rainfall 1·83 in. above, the average. R. B. GORE.

Auckland.—An unusually cold and wet November; the mean temp. being 3° below, and the rainfall more than 2·00 in. above, the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 2·9 miles. Kingston rainfall one-half the average only; but the Island rainfall was one-third above the average, this result being about the same in each division. R. JOHNSTONE.

SUPPLEMENTARY TABLE OF RAINFALL, APRIL, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	·75	XI.	Lake Vyrnwy	2·03
,,	Birchington, Thor	·75	,,	Corwen, Rhug	1·46
,,	Hailsham	·77	,,	Carnarvon, Cocksidia ...	...
,,	Ryde, Thornbrough	..	,,	I. of Man, Douglas	1·45
,,	Emsworth, Redlands ...	·49	XII.	Stoneykirk, Ardwell Ho.	1·41
,,	Alton, Ashdell	·38	,,	New Galloway, Glenlee	2·48
III.	Oxford, Magdalen Col..	·56	,,	Lilliesleaf, Riddell	·82
,,	Banbury, Bloxham	·66	XIII.	N. Esk Res. [Penicuick]	1·85
,,	Northampton, Sedgebrook	1·06	,,	Edinburgh, Blacket Pl..	·96
,,	Alconbury	·51	XIV.	Glasgow, Queen's Park..	1·83
,,	Wisbech, Bank House...	·68	XV.	Inverary, Newtown	4·57
IV.	Southend	·61	,,	Oban, The Corran	3·02
,,	Harlow, Sheering..... ...	·80	,,	Islay, Gruinart Schools..	2·66
,,	Colchester, Lexden	1·02	XVI.	Dollar.....	2·35
,,	Rendlesham Hall	1·08	,,	Balquhidder, Stronvar...	3·59
,,	Diss	...	,,	Ballinluig	1·15
,,	Swaffham	·76	,,	Dalnaspidal H.R.S.....	3·56
V.	Salisbury, Alderbury ...	·79	XVII.	Keith H.R.S.....	2·05
,,	Bishop's Cannings	1·17	,,	Forres H.R.S.	...
,,	Blandford, Whatcombe .	·54	XVIII.	Fearn, Lower Pitkerrie..	1·54
,,	Ashburton, Holne Vic...	·51	,,	N. Uist, Loch Maddy ...	3·71
,,	Okehampton, Oaklands.	·82	,,	Invergarry.....	4·13
,,	Hartland Abbey	1·06	,,	Aviemore H.R.S.	1·96
,,	Lynmouth, Glenthorne.	1·04	,,	Loch Ness, Drumnadrochit	2·27
,,	Probus, Lamellyn	·97	XIX.	Invershin	2·71
,,	Wellington, The Avenue	·49	,,	Scourie	3·68
,,	Wincanton, Stowell Rec.	·79	,,	Watten H.R.S.....	1·42
VI.	Clifton, Pembroke Road	·78	XX.	Dunmanway, Coolkelure	·88
,,	Ross, The Graig	·81	,,	Cork, Wellesley Terrace	·47
,,	Wem, Clive Vicarage ...	1·41	,,	Killarney, Woodlawn ...	1·59
,,	Cheadle, The Heath Ho.	1·35	,,	Caher, Duneske	·41
,,	Worcester, Diglis Lock	·74	,,	Ballingarry, Hazelfort...	1·05
,,	Coventry, Coundon	1·03	,,	Limerick, Kilcornan ...	1·06
VII.	Ketton Hall [Stamford]	·67	,,	Ennis	...
,,	Grantham, Stainby	·85	,,	Miltown Malbay	1·58
,,	Horncastle, Bucknall ...	·72	XXI.	Gorey, Courtown House	·41
,,	Worksop, Hodsck Priory	·94	,,	Athlone, Twyford	·92
VIII.	Neston, Hinderton	1·19	,,	Mullingar, Belvedere ...	1·19
,,	Southport, Hesketh Park	1·07	,,	Longford, Currygrane...	1·41
,,	Broughton-in-Furness ...	2·55	XXII.	Woodlawn	1·40
IX.	Ripon, Mickley.....	·82	,,	Crossmolina, Enniscoe ..	2·08
,,	Melmerby, Baldersby ...	·61	,,	Collooney, Markree Obs.	2·31
,,	Scarborough, Obs.	·68	,,	Ballinamore, Lawderdale	...
,,	Middleton, Mickleton ...	1·65	XXIII.	Lough Sheelin, Arley...	1·58
X.	Haltwhistle, Unthank...	1·93	,,	Warrenpoint.....	1·28
,,	Bamburgh	·57	,,	Seaforde..	1·29
,,	Keswick, The Bank.....	2·97	,,	Belfast, Springfield	1·97
XI.	Llanfrechfa Grange	·89	,,	Bushmills, Dundarave..	2·07
,,	Llandovery	1·15	,,	Stewartstown	1·44
,,	Castle Malgwyn	1·12	,,	Killybegs	4·34
,,	Builth, Abergwesyn Vic.	1·86	,,	Lough Swilly, Carrablagh	2·87
,,	Rhayader, Nantgwillt ...	1·28			

APRIL, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours Dpth	Greatest Fall in 24 hours Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·55	— 1·19	·08	4	11	68·4	26	32·8	24	0	11
II.		Maidstone (Hunton Court)...	...	...	...	...	...	...	...	...	...	...	...
,,		Strathfieldsaye	·87	...	·15	12	14	...	...	...	...	...	...
III.		Hitchin	·75	— 1·04	·14	12	13	65·0	22*g*	30·0	23	5	...
,,		Winslow (Addington)	·83	— 1·09	·17	15	12	66·0	22	29·0	2	5	10
IV.		Bury St. Edmunds (Westley)	·85	— ·81	·20	4	12	65·0	27	32·0	2	1	...
,,		Norwich (Brundall)	1·43	...	·40	12	16	68·4	27	31·0	3	2	16
V.		Weymouth(LangtonHerring)	·67	— 1·21	·44	13	9	64·0	26	35·0	2	0	...
,,		Torquay (Cary Green)	·10	...	·03	13*a*	5	61·9	26	37·6	22	0	0
,,		Polapit Tamar [Launceston]..	·83	— 1·39	·21	13	14	62·4	22*a*	30·5	22	1	3
VI.		Stroud (Upfield)	1·11	— 1·04	·28	13	14	65·0	27	34·0	1	0	...
,,		ChurchStretton(Woolstaston)	1·28	— 1·06	·20	14	16	66·0	24	31·5	13	1	4
,,		Tenbury (Orleton)	1·13	— ·95	·14	10*b*	15	68·8	22	30·1	2	1	8
VII.		Leicester (Barkby)	·88	— 1·22	·13	15	15	...	...	23·0	1	10	20
,,		Boston	·75	— ·96	·22	4	11	68·0	20	30·0	3*k*	3	...
,,		Hesley Hall [Tickhill].....	·70	— 1·01	·12	10*c*	12	64·0	22*h*	29·0	2	3	...
VIII.		Manchester(PlymouthGrove)	1·69	— ·02	·32	16	15	65·0	24*i*	33·0	12	0	2
IX.		Wetherby (Ribston Hall) ...	·69	— 1·16	·26	11	7	...	...	...	...	...	...
,,		Skipton (Arncliffe)	3·37	— ·06	·44	10*g*	19	..	...	...	...	...	...
,,		Hull (Pearson Park).	·87	— 1·05	·21	12	12	65·0	8, 25	30·0	3	5	9
X.		Newcastle (Town Moor)	·76	— 1·07	·12	7	14	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	5·67	— 1·47	1·03	26	16	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·01	— 1·40	·18	30	14	...	...	...	...	...	...
,,		Haverfordwest	1·16	— 1·47	·49	13	13	64·0	20	33·9	22	0	5
,,		Aberystwith (Gogerddan) ...	1·41	— 1·15	·40	13	13	63·0	21	...	...	...	...
,,		Llandudno.....	1·35	— ·46	·28	16	14	63·5	24	38·5	13	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	1·98	— ·25	·28	10*d*	14	62·0	24	32·4	2	0	...
,,		Jedburgh (Sunnyside).....	·74	— ·96	·20	10	11	65·0	24*i*	27·0	16	3	...
XIV.		Colmonell	2·09	...	·57	10	12	69·0	20*a*	29·0	1, 30	4	...
XV.		Lochgilphead (Kilmory).....	4·31	+ 1·50	·77	10	21	...	...	29·0	30	5	...
,,		Mull (Quinish).....	2·93	— ·05	·65	15	22	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·30	— ·92	·40	11*e*	6	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	·85	— 1·20	·25	16	14	65·9	21	33·0	18	0	0
XVII.		Braemar	1·05	— 1·37	·23	29	15	63·0	24	26·8	15	4	16
,,		Aberdeen (Cranford)	1·48	...	·25	28	16	65·0	8	...	..	...	...
XVIII		Strathconan [Beauly]	5·33	+ 2·52	1·16	28	13	...	...	...	...	...	...
,,		Glencarron Lodge.....	8·84	...	1·25	7	25	59·7	25	27·8	15	4	...
,,		Cawdor	1·57	+ ·05	·41	10	16	...	...	...	...	...	...
XIX.		Dunrobin	2·00	+ ·27	·65	11	15	58·5	9, 21	31·5	14	1	...
,,		S. Ronaldsay (Roeberry).....	1·68	+ ·07	·31	29	22	58·0	9	33·0	12	0	...
XX.	IRELAND.	Darrynane Abbey.....	1·41	...	·27	11	18	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	·46	— 2·01	·12	13	9	66·0	23	33·0	2	0	...
,,		O'Briensbridge (Ross)	1·41	...	·32	10	15	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	·58	— 1·70	·11	13	11	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	·88	— 1·24	·33	13	16	64·5	24	36·1	2	0	0
XXII.		Ballinasloe	1·02	— 1·32	·23	26	13	65·0	23	32·0	30	1	...
,,		Clifden (Kylemore)	2·76	...	·46	11	20	...	...	...	...	...	...
XXIII		Waringstown	1·28	— 1·14	·21	15	14	70·0	19*j*	29·0	30	3	8
,,		Londonderry (Creggan Res.).	3·03	+ ·79	·43	28	20	...	...	...	...	...	...
,,		Omagh (Edenfel)	2·52	+ ·29	·30	10*f*	18	64·0	21	33·0	10	0	4

+Shows that the fall was above the average ; —that it was below it.

a—and 24. *b*—and 28. *c*—and 14. *d*—and 16, 28. *e*—and 17. *f*—and 13, 15, 28. *g*—and 27. *h*—and 24, 25. *i*—and 25. *j*—and 20. *k*—4, 23.

METEOROLOGICAL NOTES ON APRIL, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

ADDINGTON.—A rather cold month, with a small rainfall. At no time was the frost severe enough to harm any vegetables. Stormy on the morning of the 11th. Sleet and S on the 12th. Foggy mornings on 21st and 23rd.

BURY ST. EDMUNDS, WESTLEY.—A dry month; R in small quantities on 12 days. Migratory birds several days later than usual; first swallow on 17th, cuckoo on 19th, nightingale on 22nd, sand marten on 27th, and turtle dove on 29th. H on 10th, distant T on 11th, and T on 12th.

NORWICH, BRUNDALL.—R ·24 in. deficient, and for the first four months of the year 1·14 in. deficient. Mean temp. 47°·3. Vegetation rather early; earlier than in 1895, but later than in 1893 and 1894. H on 1st, 2nd, 29th, and 30th; T on 17th, at 4 p.m.; T and L on 29th; Solar halo on 21st, at 5 p.m.

WEYMOUTH, LANGTON HERRING.—With the exception of April, 1893, the driest April since 1875. The average 9 a.m. temp., 51°·1, is 3°·7 above the average of 24 years, and with the exception of 1893 and 1894, the highest in that period. Distant T and L on the 23rd. Fog on 27th. Hawthorn in blossom on the 27th. The rainfall of the first four months of the year (4·85 in.) is the smallest for 22 years, and only 56 per cent. of the average.

TORQUAY, CARY GREEN.—Rainfall 2·36 in. below the average; mean temp. 50°·5, or 2°·4 above average. Duration of sunshine 136 hours 40 minutes, being 53 hours 50 minutes below average; one sunless day.

POLAPIT TAMAR [LAUNCESTON].—Very dry, the rainfall being only two-fifths of the average; unusually free from storms or strong winds. Bar. throughout very high. Fog early on the 8th.

WOOLSTASTON.—A beautiful spring month; all vegetation in a very forward state. Mean temp. 48°·6. Gale, with S and H on the 12th, and a meteor of remarkable brilliance passed from N.W. to S.E. about 8.5 p.m. on the same day; the light was most intense and of a pale blue colour.

TENBURY, ORLETON.—A warm, dry month, the mean temp. being nearly 3°·5 above the average. No extremes of heat or cold. Cherries, damsons, and plums in full blossom at the beginning of the month; pears about the 16th, and apples at the end of the month. Cuckoo heard on 14th.

LEICESTER, BARKBY.—A fine but chilly month. Scarcity of water already felt. Abundant bush and tree bloom. First swallow seen on 2nd; first cuckoo on 21st. Mean temp. 48°·0. Only 4·52 in. of R in the first four months of the year!

MANCHESTER, PLYMOUTH GROVE.—Thick fog on 14th and 20th; dense fog in early morning of 22nd. T and L on 28th. Mean temp. 48°.

WALES.

HAVERFORDWEST.—The month was fine, bright, and sunny; although R fell on 14 days, the quantities were small, and the general character of the weather was mild and dry. Vegetation very forward, and fruit trees in full blossom. The oak in sheltered places was in leaf on the 22nd; lilacs, chestnuts, laburnums, and rhododendrons in full bloom. High bar. pressure characterised the whole month. R anxiously looked for at the close.

ABERYSTWITH, GOGERDDAN.—The weather was very good throughout the month; winds N. and N.W.

SCOTLAND.

CARGEN [DUMFRIES].—The meteorological conditions of the month were very favourable. Barometric pressure was higher and temp. considerably warmer than the average of 37 years; there was also less R and more sunshine; while easterly winds, usually prevalent during April, were practically absent. The min. temp. did not fall to freezing point, an experience only once previously (in 1867) recorded. Rains were always light, but 1·30 in. fell in the seven days 10th to 16th, immediately followed by a marked rise of temp., the effect on vegetation of all kinds being very beneficial. Many trees were in full leaf at the close, and lilac, laburnum, and horse chestnut just bursting into flower. Farm work very forward. Sleet on 10th; H on 28th.

JEDBURGH, SUNNYSIDE.—The weather was cold and ungenial, with much E. and N.E. wind and a low night temp., but a good deal of sunshine. The land being dry, seed sowing is far advanced. Swallows seen on 22nd.

COLMONELL.—Rainfall ·24 in. below the average of 19 years. Mean temp. 48°·4, or 3°·7 above the average. H on 10th and 11th.

MULL, QUINISH.—Vegetation quite two weeks earlier than usual. Horse chestnuts and planes in full leaf by 15th. Cuckoo seen on 26th.

BRAEMAR.—A most favourable month for seed sowing. Duration of sunshine, 152 hours 10 minutes.

ABERDEEN, CRANFORD.—The month was very dull and cloudy.

S. RONALDSAY, ROEBERRY.—A cold month. Mean temp. 45°·2.

IRELAND.

DARRYNANE ABBEY.—A dry, fine month.

WATERFORD, BROOK LODGE.—Thick fog on mornings of 20th, 21st, and 22nd. H showers on 28th and 30th. Heavy T on 29th.

O'BRIENSBRIDGE, ROSS.—The best month of April for many years; cloudless sunshine for many days, and scarcely a touch of frost. Vegetation good and very forward.

DUBLIN.—A very favourable fine and spring-like month. The steadiness of the bar. was a feature of the first ten days of the month. A relapse into winter took place on the 27th, from which day the weather remained cold to the end. Very little easterly wind. Mean temp. 50°·9, or 3°·2 above the average. Slight fogs on the 20th and 21st. High winds on 8 days, reaching the force of a gale on the 10th and 12th. H fell on the 10th, 11th, 12th, 28th, 29th, and 30th. T was heard on the afternoon of the 29th.

EDENFEL, OMAGH.—On the whole a seasonable April, with occasional raw cold spells, but nothing to check vegetation, which is full and forward for the season.

THUNDERSTORM OF MARCH 24TH, 1896.

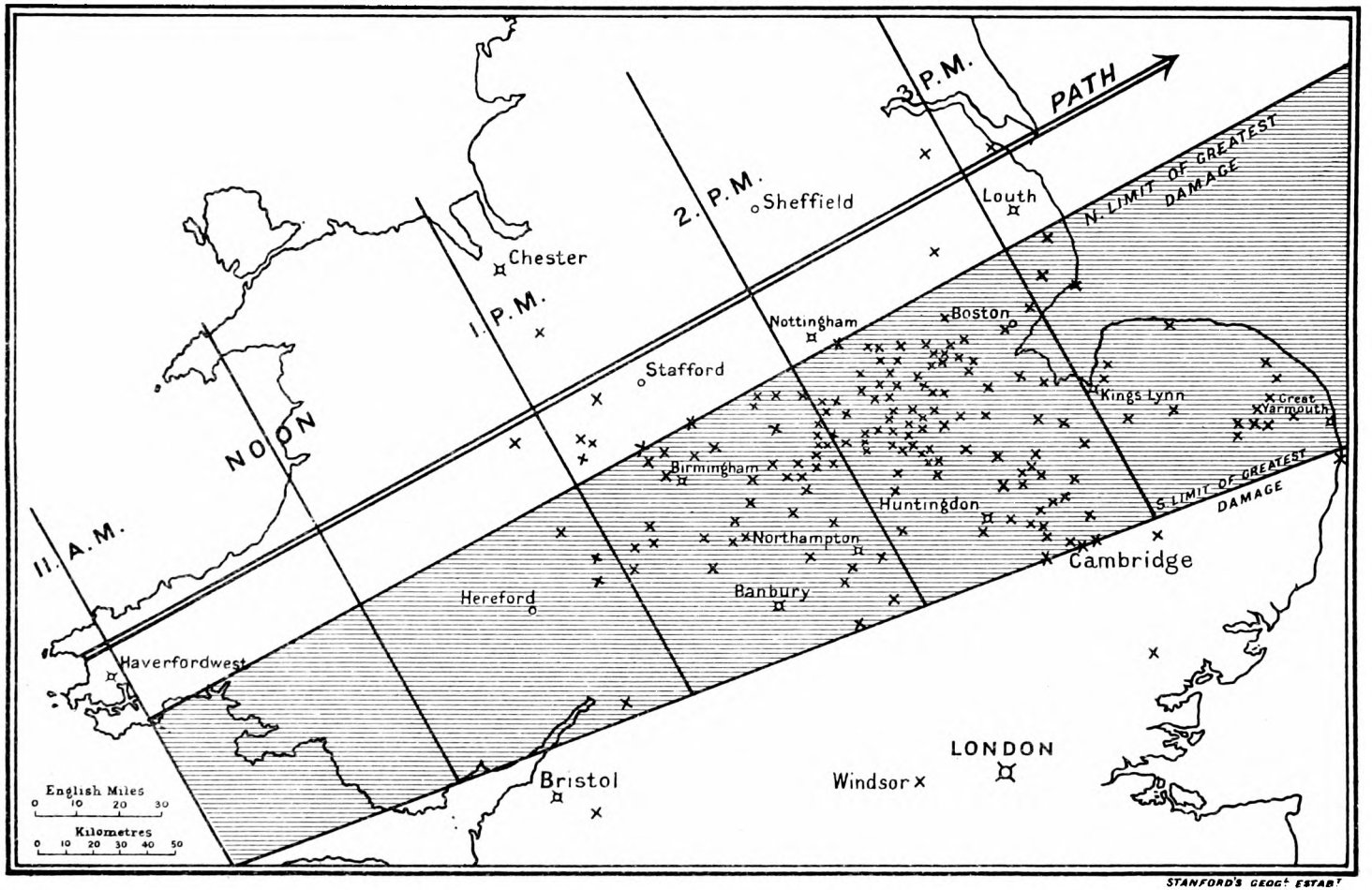
TEAN VIC., STAFFORD.—A grand TS here on 24th, between 7.50 and 9.20 p.m. Storm came up—as usual with storms here—from S., hovered for some time between S. and S.E. at a distance of from 4 to 5 miles, then advanced to a point nearly overhead—time interval for some minutes = 3 to 4 seconds. Then it moved slowly to E. L very vivid, and T almost continuous till 9 p.m. T last heard at 9.15 p.m., L last seen at 9.30 p.m. G. T. RYVES.

SALT VIC., STAFFORD.—A severe TS occurred here on March 24th. It commenced at 6.15 p.m. in S.W., and worked away towards N.W. It then backed to S.W., and worked through S. to S.E., and then another storm approached nearer from S.W. and worked through S. to E., accompanied by vivid forked lightning and heavy rain; ·25 in. fell in ten minutes. Lightning was seen in E. and N.E. until 10.30 p.m., and thunder was heard twice on the following day.

24th.....	Max. 60°	.....	Min. 28°	.....	Rain ·27 in.
25th.....	,, 58	.....	,, 39	.....	,, ·10 ,,

S. W. JONES.

SITES OF STRUCTURAL DAMAGE BY THE GALE OF MARCH 24TH 1895.



SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXV.] JUNE, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

THE WORST GALE OF THE 19TH CENTURY IN THE ENGLISH MIDLANDS.

(*Continued from p. 57.*)

LEICESTERSHIRE—(*continued*).

Great Dalby.—The school, chapel, and many private houses damaged.

Rotherby.—On the main road hence to Leicester there are, within one half-mile, 14 trees blown across the road, 12 so large as not merely to cross the road but to reach into the fields beyond.

Ashby-de-la-Zouch.—Pinnacle blown off the parish church, and hundreds of trees uprooted.

Frisby-on-the-Wreak.—Tremendous storm between 2 and 3 p.m. A strong wall blown down, and also so many trees that the roads were blocked.

Asfordby, Melton Mowbray.—Few houses escaped entirely, and many ricks were blown over.

Melton Mowbray.—Much damage to property, the brewery chimney blown down, and trees of all descriptions broken or uprooted. The streets strewn with tiles, skylights, &c.

Wymondham.—Terrific gale. 1 to 3 p.m.; one lofty and many private chimneys blown over, in fact few buildings escaped entirely.

Sheepshed.—Terrific storm from 1.50 to 2.20 p.m., about 15 yards of the wall of the cemetery was blown down, and the streets were littered with tiles, slates, and spouts.

Loughborough.—Besides small injuries, three factory chimneys fell about 2.30 p.m., one being 114 feet high. A wooden theatre was wrecked, and two gable ends were blown out.

Belton.—Roof of parish church and of many private houses damaged, air full of thatch.

Garthorpe.—A pinnacle blown off the church roof.

Ab-kettleby.—Damage general, but not very serious.

Buckminster.—The conservatory at Lord Dysart's house was completely lifted from its foundations and fell a perfect wreck. Much other damage was done.

Sproxton.—Two heavy double chimney stacks on Sproxton Lodge overturned and broke through the roof.

Waltham.—Gale worst, 2 to 3 p.m.; two houses stripped of every tile and one of all its thatch, the gable end of one house was blown in, several chimneys overthrown.

LEICESTERSHIRE—(*continued*).

Stathern.—Much damage; two cottages had part of their gables displaced and became uninhabitable.

Harby, Melton Mowbray.—Many stacks overturned, and many houses lost tiles, slates or thatch.

RUTLANDSHIRE.

Seaton.—Church spire damaged, and a cross at the end of the nave overthrown.

Barrowden.—Chimneys, roofs and stacks damaged, and the spray from the river carried into the village.

Uppingham.—Much damage from 2 to 2.30 p.m.; the town strewn with slates, chimney pots, &c. So many trees across the main road that the mail cart had to be sent another way.

S. Luffenham.—Windmill wrecked.

N. Luffenham.—A chimney stack overturned at the inn, and slates or thatch torn off nearly every house.

Preston.—There is scarcely a building undamaged, the top of the church spire loosened.

Ridlington.—Terrible gale, many stacks blown away.

Ketton.—Many chimneys blown over, and the roads blocked with fallen trees. Gale worst, 2 to 3 p.m.

Hambleton.—Two large trees overturned about 2 p.m., one of them broke through the roof of a house, and also knocked down the chimneys.

Great Casterton.—Churchyard wall blown down, also chimney at Wesleyan school.

Empingham.—The worst storm remembered. Thatch, tiles and slates were hurled in all directions, and many trees overturned.

Oakham.—Considerable damage, houses unroofed and chimney stacks blown down. Two pinnacles blown off the parish church.

Ryhall.—Violent gale between 1 and 3.30 p.m., carrying away not only stacks and trees but even wooden buildings.

Burley-on-the-Hill.—Great damage to the trees; out of the elm avenue, 60 were torn up.

Teigh.—Several houses stripped and stacks blown away. A pinnacle blown off the church, but it did not break through the roof.

LINCOLNSHIRE.

Stamford.—The majority of the churches and houses were damaged. The gale was so heavy that the water of the Welland was blown into waves, and the spray carried over the bridge. A chimney, 65 feet high, was seen to oscillate, and a gust at 2.15 p.m. brought it down.

Market Deeping.—Houses unroofed and chimneys blown down in great numbers. On the Lolham Road, 27 large trees uprooted.

Crowland.—The storm lasted from 1 to 4 p.m., and did more damage than any storm remembered. The windmills lost their sails, nearly every large chimney is gone, many houses are unroofed, and 17 fine elms were blown down in one row. The streets presented a lamentable appearance, just as if there had been a bombardment.

Castle Bytham.—Windmill damaged, and many roofs stripped.

Bourne.—Great havoc among the trees, and between 2.30 and 4 p.m. the streets strewn with wreckage from the roofs.

LINCOLNSHIRE--(*continued*).

Long Sutton.—Enormous damage; houses unroofed, chimneys blown down, trees uprooted, stacks overturned, and skylights removed. Very few houses escaped.

Holbeach.—A Maltese cross blown off the cemetery chapel, a chimney stack fell through a roof, a long wall was blown down, and several windmills were damaged.

Spalding.—The damage has not been equalled for many years. At the Johnson Hospital, a chimney stack fell through the roof into one of the wards. In several parts of the town, house ends were blown in and roofs removed in whole or in part. At St. John's Church, during afternoon service, part of one end was blown in, and part of the roof removed. The end of *Whaplode* cemetery chapel was also blown in.

Colsterworth.—The gale between 2 and 3 p.m. stripped slates, tiles, or thatch from nearly every roof.

Corby.—Church so damaged that evening service was not held.

Surfleet.—Scarcely a building escaped without loss of tiles or slates, and many chimney stacks were overturned.

Aslackby.—Several trees down and roofs damaged.

Pointon.—The bell turret and bell at the schools blown down, and the north side of the roof of the church so damaged that service could not be held.

Gosberton.—Church and chapel both damaged.

Billingborough.—Terrible havoc for about half-an-hour, about 3 p m.; both public and private buildings have suffered severely. The public hall and the board schools are badly damaged.

Ropsley.—A pinnacle of the church blown down, and in falling it carried away part of the old church, dating back to 1486; private houses merely lost tiles or slates.

Horbling.—Two of the pinnacles of the church, each surmounted by a vane, were carried away.

Donington.—House property suffered severely, and many trees were blown down.

Grantham.—Chimney stack overturned about 3 p.m., and fire escape blown on to roof of engine house; street lamps blown down, and many roofs stripped.

Swaton.—One of the pinnacles was blown off the church, fell on to the chancel roof, and broke through and smashed one of the choir stalls.

Great Hale.—The church was so weakened by the gale that extensive repairs will be necessary.

Boston.—Several warehouses partly unroofed, a corrugated iron building overturned, also a new wall, 60 feet long, and many chimney stacks. Most of the churches and schools were damaged.

Honington.—Streets and roads blocked by broken trees and portions of roofs.

Long Bennington.—Considerable damage to chimneys, and many trees down.

Sleaford.—About 6 feet blown off the top of the Handley Monument, several houses damaged by chimney stacks falling through the roofs, and a pinnacle blown off the west front of the church.

Skegness.—Considerable damage to chimneys and roofs.

Spilsby.—Trees and chimneys have been blown down and stacks scattered, but the damage was less severe than at some other places.

LINCOLNSHIRE—(*continued*).

Horncastle.—The damage was not very serious, but roofs, chimneys, &c., suffered.

Fiskerton.—A gale of unexampled fury, the river Witham was as rough as the sea, and washed over the ferry boats and filled and swamped an open one. Much damage to farm buildings, and many stacks scattered.

Lincoln.—No serious damage.

Alford.—Three of the crocketted pinnacles of the church tower were blown down, two of them cut large holes in the roof of the nave. Many trees and chimneys blown down, and part of the roof taken off the goods station of the G. N. R.

Louth.—Between 3 and 3.30 p.m. it was not safe to be in the streets, not merely owing to falling tiles and masonry, but because it was hardly possible to stand.

Brigg.—In the afternoon, children were lifted off their feet and blown down. Many stacks of chimneys fell, and tiles and chimney pots went away by dozens.

Grimsby.—Considerable damage, several chimney stacks overturned, one fell through the roof of the hospital and killed a patient. The roof of a house at *Scartho* was lifted bodily and carried some distance.

NOTTINGHAMSHIRE.

Cropwell Bishop.—Several buildings damaged, trees and stacks blown over.

Nottingham.—Roof of goods shed at Midland Railway destroyed, and two plate glass shop windows blown in. Many trees down in the suburbs.

CHESHIRE.

Dodcott.—An extensive run of farm buildings wrecked, and cattle buried under them.

Chester.—Windows blown in, chimney pots, chimneys, and tiles blown away.

The following note, which has been received since the issue of our last number, is a valuable addition to the Worcestershire details.

SIR,—In the catalogue of disasters caused by the great storm on March 24th, 1895 in Worcestershire, the damage to the beautiful Priory Church at Malvern might be included. Two pinnacles were blown down and fell through the roof, the cross at the E. end was taken off, and a window was blown in. Many houses were damaged, and on this one, every chimney pot but one was dislodged. The gust which did the mischief occurred about 1 p.m.—Yours faithfully,

C. S. PRINGLE.

Knotsford Lodge, Malvern.

SUMMARY.

From the evidence in the previous 11 pages of this article it will be seen that the storm crossed from S. Wales to Lincolnshire between 11 a.m. and 4 p.m. on Sunday, March 24th, 1895. There is no day or time at which so few regular meteorological observations are made as during these five hours on a Sunday. Consequently in studying the storm path we have to rely upon (1) the reports of skilled observers such as those in the *Met. Mag.* 1895 pp. 41-43 and 51-52, (2) the records of self-recording instruments, and (3) the

numerous statements made by our correspondents and in the local newspapers.

The Meteorological Office had ordered storm signals to be hoisted, and at 8 a.m. on the 24th, the centre (28·50 in.) of a well-marked cyclone was over the Shetland Isles, but it was not that cyclone which caused the mischief, but a "secondary" at the South of Ireland where (but for its existence) the pressure would have been about 29·2 in. Instead of 29·2 in., however, it was under 29 inches, and it was this small disturbance which rushed across Wales and England, leaving death and disaster along its track, and which at 6 p.m. had (according to the *Weekly Weather Report*) nearly reached Denmark. This would imply an average velocity of translation of about sixty miles an hour.

Next we turn to the times recorded by our own correspondents, and in the notes which we have already given—some, it is true, are vague—a very few (*e.g.*, Peterborough, 1.50 p.m.) are obviously wrong, but we tabulated them all before putting any of them on a map, and therefore without adapting them to fit any theory. Having plotted them all (about 70 places) on a map we find that they agree very well with a path going E. 30° N. from St. Bride's Bay in South Wales to Spurn Head, being over Haverfordwest at 11 a.m. and going at the rate of *58 miles an hour*—thus agreeing very closely with the direction and velocity obtained from the publications of the Meteorological Office.

Very little damage was done north of the path which we have mentioned, nor was the mischief serious on or near to the path on its south side—but it seems that the greatest havoc was wrought in a zone whose northern limit was about 30 miles south of the line, and which increased in breadth (going eastwards) from 50 to about 70 miles.

These features we have represented on the accompanying map, which we are quite aware is much more rectilinear than is usual. The path might have been drawn as a curve from a centre 500 miles to N.N.W., and the hour lines might have been curves drawn with radii of 100 miles, but straight lines fitted the facts better than curves; and, after all, the position of the × (sites of damage) and the times recorded in our account are the essential features, and having put the facts on record, we do not at all mind how severely our diagram is attacked.

Since drawing the map, we have come upon two observatory reports giving time, and it is satisfactory to find that they fit almost precisely the lines laid down. The statements are:

Birmingham.—The greatest pressure of the wind was 37lbs., but the time is not known, as *the oscillation of the building stopped the clock at* 1.30 *p.m.* (According to our map, the centre passed Birmingham at 1.25 p.m.).

Greenwich.—Max pressure 36lbs. at about 2.10 p.m. (Precisely the time shown by our map).

As to the damage, we are aware that our list is far from complete, and it would be absurd to attempt to put any specific sum as covering the disasters. The loss of life was wonderfully small, only 14 deaths are reported, but the cases of injury were far more numerous.

The foregoing reports from more than 200 localities naturally afford material for consideration. We are, of course, aware that an open door or window facing a very strong wind may cause one on the opposite side of the house to be blown out, and there are several instances in the preceding list of windows and of gables being blown *in*, but on the other hand we find more than a dozen cases, many of which could be very well explained by the expansion of the air inside the building, owing to the passage of a diminished atmospheric pressure. The following are the cases to which we refer.

Place.	Event.	Page on which reported.
Tottenham Court Road ...	Window blown out	50
Peterborough	Gable ends forced out. Wood and iron stable lifted bodily.....	51
Godmanchester.....	Gable fell outwards	51
Soham	Several cottages had one end blown out.....	52
Norwich	Workhouse roof lifted. Roofs of two cottages lifted.....	53
North Heigham	The gables of several houses fell out	53
Ironbridge	Two windows blown out.....	54
Worcester.....	The roof of a tannery was lifted bodily	55
Stratford on-Avon	Roof of goods shed lifted off	55
Broughton Astley	A newly-built shed, 120 ft. long and roofed with slate, was lifted bodily and carried some feet	56
Loughborough	Two gable ends were blown out	65
Buckminster.....	The conservatory .. ... was completely lifted from its foundations and fell a perfect wreck	65
Grimsby	The roof of a house at Scartho was lifted bodily and carried some distance	68

ROYAL METEOROLOGICAL SOCIETY.

The monthly meeting of this Society was held on Wednesday evening, May 20th, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. E. Mawley, F.R.H.S., President, in the chair.

Mr. R. H. Curtis, F.R.Met.Soc., read a paper on the exposure of anemometers, and showed photographs of the positions of several of the British anemometers, and referred to the deflection of the wind by the various buildings on which they were mounted, and by surrounding objects. The effect of surroundings in both diminishing and increasing the records obtained was clearly exhibited by a critical

discussion of the results of the Kew pattern Robinson, the Stokes's bridled, and the Dines's pressure tube, anemometers at Holyhead. The position of the instruments was shown in plan, and by near and distant views from various points of the compass. The exposure of the Tube and Bridled instruments is proved to be satisfactory by the accordance of the results, while the Robinson, mounted 5 feet above the apex of the lantern of a disused lighthouse, and 53 feet above the floor of the pier, is variously affected by sheds and erections on the pier, although all of them are about 30 feet below the cups.

The values were arranged according to the direction of the wind under eight points, and afterwards the observations under each direction were grouped according to the velocity, in 10-mile groups; *e.g.*, all the observations of wind from North in which the force ranged from 26 to 35 miles per hour, as shown by the Robinson instrument, were put together, and the mean difference between the records of the two instruments obtained; and similarly for each of the other seven points, and for the other velocities. No observation in which the force was less than 11 miles per hour was used, and the lowest group included all velocities from 11 to 25 miles per hour.

Taking first the means of all the observations under each point, irrespective of velocity, it was found that with wind from N., S.E., and S., the record of the Robinson instrument is *greater* than that of the "Tube" instrument; whilst with winds from E., S.W., W., and N.W., it is *less*; with a N.E. wind, however, the record by both instruments is the same. The greatest excess is 13·2 per cent. with S. winds, and the greatest deficiency 22·8 per cent. with W. winds.

Examining the groupings under velocities, it is found that generally the amount of the difference varies directly with the force of the wind, and therefore the maximum errors are greater. Thus the greatest excess is 18·3 per cent. with S. winds of velocity 36 to 45 miles, and the greatest deficiency 24·1 per cent. with W. winds, velocity 11 to 25 miles.

In grouping all winds under eight points of the compass, the results for any one wind are to a certain extent masked by the inclusion of winds blowing in a slightly different direction (*e.g.*, the observations under E. include all between E.N.E. and E.S.E.). This is clearly shown by the tabulation of about 40 observations of velocity 11 to 25 miles at each of the sixteen points, which gives for S.S.E. an excess of 21·8 per cent., and for W. a deficiency of 25·2 per cent., or a total range of error of 47 per cent.

The conclusion of the whole matter is: that for anemometrical records to be reliable, not only must the instrument be exposed in an open place, free from local obstructions, but the stand which carries it must offer practically no resistance to the wind; that the "stand" should be formed by a house, no matter what its shape or size, unless the cups can be placed farther above the roof than is

generally possible, is undesirable, not to use a stronger term. A suitable open structure, with a hut for the recording apparatus, could generally be erected wherever a Robinson, or a pressure plate, instrument is required; but one of the great advantages offered by the Dines's "Tube" instrument is the facility with which the vane can be placed in a satisfactory position.

In the discussion which followed, the President spoke of the unsatisfactory condition of Anemometry shown by the paper, and said that he would like to see a comparison of the records of a set of similar instruments well exposed at different heights above ground.

Mr. Gaster said it was evident that the Robinson anemometer at Holyhead was sheltered, and that many others were worse. Comparison of the light vessel and anemometer observations at Yarmouth showed that with a W. wind of 50 miles an hour, the instrument recorded only 25 miles owing to the friction in passing over the houses in the town.

Mr. Symons exhibited a diagram drawn by the Rev. F. W. Stow, illustrating the effect on air currents of objects surrounding a rain gauge, and said that as early as 1862 or 1863, the late Dr. Clouston, of Orkney, had pointed out the bad result of placing an anemometer on the roof of a house.

Mr. Dines considered the bridled anemometer to be the only reliable form of pressure instrument in use. If the exposure be bad for one direction or force it is bad for all. He had three similar instruments, 40 feet, 20 feet, and 10 feet above the roof of his house, and found that from directions in which the exposure was good, taking the 40-feet instrument as true, the 20-feet gave a record of 90 per cent., and the 10-feet of 80 per cent., while from a sheltered direction the 20-feet gave 80 per cent., and the 10-feet 70 per cent., the difference being the same with all velocities.

Mr. C. Harding did not think he was speaking too strongly in describing the whole science of Anemometry as rotten. At Yarmouth the town reduced the velocity of a W. wind by half, while an E. wind was increased by striking the house on which the instrument was fixed, and being deflected upwards. He believed that the enormous difference in the records at Fleetwood and Liverpool was entirely due to exposure, while the paper showed that at Holyhead, which had been looked upon as one of the best stations in the country, there was an error of nearly 50 per cent. between the records of two different winds. He referred to the good work done by Mr. Chatterton for the Wind Force Committee in comparing the records of anemometers with the records of light ships, and thought that the comparison of the Beaufort Scale and Anemometer results should be re-worked.

Mr. Baker hoped that the paper would bear good fruit, as the question of Anemometry was to be discussed at the International Congress at Paris.

Mr. Munro said that the Robinson anemometer was so constructed

as to be unsuitable for fixing more than about 15 feet above a roof, as the upper works weigh about three cwt.

Mr. Baldwin Latham compared the measurement of wind velocity to the measurement of the current in a river in which, with a rocky bed it is almost impossible to get true results.

Admiral Maclear, Dr. Mill, and Messrs. R. H. Scott, R. Inwards, H. Southall, and C. E. Peek also took part in the discussion.

An interesting collection of photographs of clouds, presented to the Society by Mr. H. C. Russell, F.R.S., of the Sydney Observatory, was also exhibited.

FOG, MIST, HAZE.

To the Editor of the Meteorological Magazine.

SIR,—It appears to me that your correspondent in this month's Magazine has stated very fairly the facts which should form the basis of any discussion as to the use which meteorologists should make of the above terms; and especially do I agree with him in the distinction which he draws between the artificially produced smoke-fogs of large towns, and "nature's fog," which, as he points out, is always composed of water particles alone.

To discriminate between these two phenomena, which resemble each other only in the fact that they both cause obscuration, is, I consider, most important, since the conditions under which they are formed are essentially different in the two cases. To do so, however, in such a city as London, is not always easy; because, although the anti-cyclonic smoke-fogs are generally free from water particles, and are true "dry fogs," the water fogs are always combined with more or less smoke, making it sometimes difficult to say which predominates, and in which category the fog should be placed. If, however, the smoke-fog is to be confined to anti-cyclonic conditions, as I gather is the view of your correspondent, this difficulty would be much reduced.

As regards the suggested definitions, I do not think it wise that the difference between fog and mist should rest upon what can "be seen with the naked eye"—a test in which I fear two persons would be very apt to disagree. If I correctly understand your correspondent, he would describe as "mist" a fog in which the water particles were just merging into tangible rain-drops—a view of the matter which I think will meet with the approval of most meteorologists, although I know that many have hitherto regarded a mist as a slight fog. But, assuming your correspondent's definition to be acceptable, it would surely be possible to define the condition in such terms as would make what is meant perfectly clear, without leaving much to the judgment of observers, and leaving still less to the arbitration of a sense which varies so much with different men as eyesight.

There is only one other criticism I would offer, which is that town smoke, "*drifting over the country*," would in all probability have become so attenuated, as soon as it had got clear of its place of origin, as to bring it within the definition given for "haze," rather than fog.

But, generally, I agree with the definitions offered; and at all events a practical scheme, based on a correct view of the phenomena, has been put forward, which it should not be difficult to modify in such a way as to make it generally acceptable to meteorologists.

I am, yours obediently,

F.R.MET.SOC.No. 2.

BURST WATER PIPES.

OUR readers may remember the discussion in the *Met. Mag.* in 1895 as to burst water pipes, and that we urged that the water in the mains did not freeze because the ground around the pipes was frozen—*i.e.*, because they were not laid deep enough—but because ice-cold water was poured into them, and because cold was conducted to them by inadequately protected house services and by fire hydrants—in fact, by cold conducted to the mains otherwise than through the earth.

Dr. Jordan's report* confirms this view. He says (p. 15): "The freezing of water pipes caused considerable inconvenience in this district [Lancashire]; the nature of the ground and the amount of shade must have had some influence in this respect, because some pipes, fully 2 feet deep, appear to have frozen. My notes show that at 2 feet deep, in ground fully exposed, the lowest temperature recorded was 32°·8 on February 17th, 18th, and 19th, 1895."

We have, therefore, here one more case of the water pipes being colder than the soil at the depth at which they were sunk.

We hope that it will be many years before such a frost occurs again in this country, but we feel sure that the remedy lies rather in stopping the conduction of cold to the mains, than in the costly method of sinking them to a considerable depth.

LIGHTNING AND TREES.

INVESTIGATIONS made by Dr. Carl Müller, and reported in *Himmel und Erde*, show that lightning prefers to strike certain kinds of trees. Under the direction of the Lippe-Detmold Department of Forestry, statistics were gathered showing that in eleven years lightning struck fifty-six oaks, three or four pines, twenty firs, but not a single beech tree, although seven-tenths of the trees were beech. It would seem, then, that one is safer in a storm under a beech tree than under any other kind.

* Report of F. W. Jordan, M.R.C.S., Dip.San.Sci., &c., Medical Officer of Health to the Heaton Norris District Council for the year 1895. 8vo., Heaton Norris, 20 pages and folding plate.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, DECEMBER, 1895.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	56·4	5	26·1	22	44·9	35·2	36·5	87	62·9	25·9	2·19	16	7·0
Malta	69·9	19	44·2	31	61·2	53·4	48·7	76	115·8	38·0	3·52	15	6·9
Mauritius	83·7	8	67·3	16	81·6	72·2	67·3	75	134·5	57·2	6·55	16	6·5
Calcutta	80·6	2	47·4	25	76·7	54·7	50·9	61	136·6	38·0	·00	0	2·2
Bombay	87·9	30	66·0	15	85·1	70·1	63·3	63	135·5	51·8	·00	0	1·5
Ceylon, Colombo	89·7	16	69·2	12	85·9	73·2	69·2	76	150·0	62·0	9·44	14	5·6
Melbourne	98 9	8	45·3	30	77·7	54·8	51·9	64	155·9	35·1	2·17	15	5·1
Adelaide	99·8	7	50·2	22	82·3	59·2	49·9	48	155·5	39·8	·69	9	3·9
Sydney	96·1	15	58·5	30	80·5	65·3	59·0	64	157·2	49·4	2·90	20	5·8
Wellington	76·0	30	53·0	12	68·9	57·5	55·1	75	145·0	40·0	1·62	12	4·6
Auckland	83·0	31	52·0	1	72·6	58·1	55·2	71	142·0	48·0	·99	5	4·0
Jamaica, Kingston	89·0	8	62·8	21	85·6	68·2	65·5	74	...	...	1·87	3	3·2
Trinidad	90·0	5	67·0	*var.*	86·5	69·4	71·1	81	165·0	64·0	7·32	8	...
Grenada	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	53·9	20	1·4	12	36·0	23·2	28·0	84	70·0	—3·0	4·21	15	8·0
New Brunswick, Fredericton	57·7	31	—14·8	13	32·6	14·4	21·4	78	...	...	2·66	8	5·1
Manitoba, Winnipeg	43·9	13	—28·7	26	19·9	—3·9	...	...	...	...	1·75	13	5·6
British Columbia, Esquimalt	55·1	11	24·2	17	44·1	36·1	38·6	92	...	...	11·60	26	8·1

REMARKS.

MALTA.—Adopted mean temp. 56°·9, 0°·7 above the average. Mean hourly velocity of wind 12·2 miles. Average temp. of sea 64°·9. Thunderstorms on 4 days, and lightning on 2 other days. H on 3 days. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·7 below, of dew point 0°·6 below, and rainfall 1·37 in. above, their respective averages. Mean hourly velocity of wind 11·8 miles, or 0·9 above average; extremes, 27·9 on 26th, and 0·0 on 13th; prevailing direction, E.S.E. to E. by N. Lightning on 18th, 19th, and 20th. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Lightning was seen on the 2nd. Thunderstorms occurred on the 3rd, 4th, 17th, and 18th. D. G. MANTELL.

Adelaide.—Mean temp. 0°·2 below the average of 38 years; rainfall ·16 in. below the average. Total rain for the year 21·28 in., or ·83 in. above the average. C. TODD, F.R.S.

Sydney.—Mean temp. 3°·1 above, humidity 5·3 below, and rainfall ·30 in. above, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Fine in the early part of the month; showery from 4th to 11th, and slight rain occasionally from 15th to 23rd, with intervals of fine weather; the latter part fine. Prevailing wind N.W.; strong on nine days. Mean temp. 2°·4 above the average, and rainfall 2·19 in. below, or less than half, the average. R. B. GORE.

Auckland.—An unusually dry month, the rainfall being less than half the average. Mean temp. slightly below the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 3·9 miles. "Northers" on 11th, 13th, and 14th. Kingston rainfall about the average; Northern half of Island two-thirds, and Southern half one-fourth, the average fall, giving a mean of half the average for the Island for the month. Kingston rainfall for the year 55 per cent., and Island rainfall 95 per cent., of the average. R. JOHNSTONE.

TRINIDAD.—Rainfall 2·61 in. above the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, MAY, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	·38	XI.	Lake Vyrnwy	...
,,	Birchington, Thor	·31	,,	Corwen, Rhug	·16
,,	Hailsham	·36	,,	Carnarvon, Cocksidia ...	...
,,	Ryde, Thornbrough	·50	,,	I. of Man, Douglas	·27
,,	Emsworth, Redlands ...	..	XII.	Stoneykirk, Ardwell Ho.	·61
,,	Alton, Ashdell	·33	,,	New Galloway, Glenlee	·62
III.	Oxford, Magdalen Col..	·19	,,	Lilliesleaf, Riddell	·78
,,	Banbury, Bloxham	·21	XIII.	N. Esk Res. [Penicuick]	·50
,,	Northampton, Sedgebrook	·27	,,	Edinburgh, Blacket Pl..	·57
,,	Alconbury	·39	XIV.	Glasgow, Queen's Park..	·60
,,	Wisbech, Bank House...	·45	XV.	Inverary, Newtown	·86
IV.	Southend	·19	,,	Oban, The Corran	...
,,	Harlow, Sheering..... ...	·78	,,	Islay, Gruinart Schools..	·38
,,	Colchester, Lexden	·21	XVI.	Dollar.....	·70
,,	Rendlesham Hall	·30	,,	Balquhidder, Stronvar...	·85
,,	Diss	...	,,	Ballinluig	·62
,,	Swaffham	·70	,,	Dalnaspidal H.R.S.....	1·27
V.	Salisbury, Alderbury ...	·30	XVII.	Keith H.R.S.....	1·67
,,	Bishop's Cannings	·27	,,	Forres H.R.S.	...
,,	Blandford, Whatcombe .	·28	XVIII.	Fearn, Lower Pitkerrie..	·90
,,	Ashburton, Holne Vic...	·02	,,	N. Uist, Loch Maddy ..	1·50
,,	Okehampton, Oaklands.	·07	,,	Invergarry	·77
,,	Hartland Abbey	·07	,,	Aviemore H.R.S.	·99
,,	Lynmouth, Glenthorne.	·08	,,	Loch Ness, Drumnadrochit	·85
,,	Probus, Lamellyn	·05	XIX.	Invershin	·39
,,	Wellington, The Avenue	·07	,,	Scourie	3·46
,,	Wincanton, Stowell Rec.	·17	,,	Watten H.R.S.....	1·63
VI.	Clifton, Pembroke Road	·30	XX.	Dunmanway, Coolkelure	·10
,,	Ross, The Graig	·18	,,	Cork, Wellesley Terrace	...
,,	Wem, Clive Vicarage ...	·32	,,	Killarney, Woodlawn ...	·29
,,	Cheadle, The Heath Ho.	·24	,,	Caher, Duneske	·15
,,	Worcester, Diglis Lock	...	,,	Ballingarry, Hazelfort...	·16
,,	Coventry, Coundon	·34	,,	Limerick, Kilcornan ...	·20
VII.	Ketton Hall [Stamford]	...	,,	Ennis	...
,,	Grantham, Stainby	·60	,,	Miltown Malbay	·55
,,	Horncastle, Bucknall ...	·77	XXI.	Gorey, Courtown House	·15
,,	Worksop, Hodsck Priory	·56	,,	Athlone, Twyford	·28
VIII.	Neston, Hinderton	·45	,,	Mullingar, Belvedere ...	·27
,,	Southport, Hesketh Park	·47	,,	Longford, Currygrane...	·36
,,	Broughton-in-Furness ...	·63	XXII.	Woodlawn	·58
IX.	Ripon, Mickley.....	·42	,,	Crossmolina, Enniscoe ..	·93
,,	Melmerby, Baldersby ...	·46	,,	Colloony, Markree Obs.	·96
,,	Scarborough, Obs.	·85	,,	Ballinamore, Lawderdale	1·15
,,	Middleton, Mickleton ...	·49	XXIII.	Lough Sheelin, Arley...	·37
X.	Haltwhistle, Unthank...	·55	,,	Warrenpoint.....	·17
,,	Bamburgh	·89	,,	Seaforde..	·25
,,	Keswick, The Bank.....	·74	,,	Belfast, Springfield	·84
XI.	Llanfrechfa Grange	...	,,	Bushmills, Dundarave..	1·07
,,	Llandovery	·05	,,	Stewartstown	·67
,,	Castle Malgwyn	·17	,,	Killybegs	...
,,	Builth, Abergwesyn Vic.	·11	,,	Lough Swilly, Carrablagh	1·27
,,	Rhayader, Nantgwillt ...	·11			

MAY, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·14	— 1·76	·12	21	3	78·9	29	36·1	4	0	5
II.		Maidstone (Hunton Court)...	·32	— 1·06	·18	21	3	...	...	...	...	..	...
,,		Strathfieldsaye	·26	...	·16	21	3	...	...	...	...	...	...
III.		Hitchin	·32	— 1·63	·22	21	3	77·0	12	31·0	1	2	...
,,		Winslow (Addington)	·31	— 1·79	·23	21	3	77·0	18*b*	29·0	2	4	6
IV.		Bury St. Edmunds (Westley)	·61	— 1·14	·38	20	5	71·0	18	34·0	1	0	...
,,		Norwich (Brundall)	·73	...	·35	20	7	76·0	14	34·2	5	0	9
V.		Weymouth(LangtonHerring)	·15	— 1·46	·11	21	3	72·0	12	37·0	3	0	...
,,		Torquay (Cary Green)	·03	...	·03	21	1	72·1	29	40·0	1	0	0
,,		Polapit Tamar [Launceston]..	·07	— 1·76	·07	21	1	76·4	12	30·0	4	2	3
VI.		Stroud (Upfield)	·29	— 1·75	·22	21	5	76·0	31	37·0	2, 3	0	...
,,		ChurchStretton(Woolstaston)	·29	— 2·58	·08	21	6	74·0	12*c*	34·5	1	0	4
,,		Tenbury (Orleton)	·32	— 2·23	·16	20	4	79·1	12	30·5	4	2	7
VII.		Leicester (Barkby)	·64	— 1·33	·54	21	5	79·0	12*c*	23·0	1	7	14
,,		Boston	·69	— 1·03	·30	21	9	85·0	12	31·0	1	2	...
,,		Hesley Hall [Tickhill].....	·52	— 1·52	·39	21	6	78·0	12	29·0	3	4	...
VIII.		Manchester(PlymouthGrove)	·60	— 1·75	·42	21	5	80·0	12	33·0	1	0	1
IX.		Wetherby (Ribston Hall) ...	·50	— 1·45	·45	23	2	...	...	...	...	...	...
,,		Skipton (Arncliffe)	·74	— 2·98	·44	19	6	..	...	...	...	...	...
,,		Hull (Pearson Park).	·62	— 1·26	·31	21	7	77·0	12	31·0	2	1	6
X.		Newcastle (Town Moor)	·71	— 1·04	·31	21	5	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	1·17	— 7·44	·61	19	5	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	·14	— 2·71	·08	13	3	...	...	...	...	...	...
,,		Haverfordwest	·06	— 2·30	·06	21	1	75·9	12	30·2	2	2	7
,,		Aberystwith (Gogerddan) ...	·78	...	·38	18	3	74·0	11	...	...	...	...
,,		Llandudno.....	·53	— 1·40	·25	21	3	72·0	12	37·0	1	0	...
XII.		Cargen [Dumfries]	·68	— 1·84	·38	18	3	79·0	11*d*	31·6	1	1	...
,,		Jedburgh (Sunnyside).....	·89	— 1·01	·48	21	5	82·0	11	35·0	4	0	...
XIV.		Colmonell	·70	...	·43	18	3	79·0	11	29·0	1	...	...
XV.		Lochgilphead (Kilmory).....	·95	— 2·40	·50	18	6	...	...	31·0	1	1	...
,,		Mull (Quinish).....	1·52	— 1·43	·39	19	13	...	...	...	...	...	...
XVI.		Loch Leven Sluices	·60	— 1·96	·40	19	2	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	·75	— ·91	·35	21	6	80·6	11	35·5	1	0	...
XVII.		Braemar	·98	— 1·43	·40	19	8	73·3	11	32·3	4	0	13
,,		Aberdeen (Cranford)	1·25	...	·57	21	11	70·0	11*d*	37·0	1	0	..
XVIII	SCOTLAND.	Strathconan [Beauly]	1·26	— 1·83	·80	20	3	...	...	..	...	...	...
,,		Glencarron Lodge.....	2·07	...	·77	19	13	74·0	10	34·4	1	0	...
,,		Cawdor	·57	— 1·18	·22	19	8	...	...	...	...	..	...
XIX.		Dunrobin	...	...	...	...	...	...	...	...	...	...	...
,,		S. Ronaldsay (Roeberry).....	1·73	+ ·01	·64	21	10	68·0	10	39·0	2	0	...
XX.		Darrynane Abbey.....	·44	...	·19	5	5	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	...	...	...	...	...	...	...	...	...	...	...
,,		O'Briensbridge (Ross)	·26	...	·06	18*a*	5	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	·12	— 2·22	·10	19	2	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	·19	— 1·74	·08	18	7	71·8	29	36·2	1	0	1
XXII.	IRELAND.	Ballinasloe	·24	— 2·45	·08	4	6	75·0	13	28·0	1	1	...
,,		Clifden (Kylemore)	1·44	...	·43	18	6	...	...	...	...	.	...
XXIII		Waringstown	·30	— 2·14	·16	18	5	80·0	26	33·0	2	0	3
,,		Londonderry (Creggan Res.).	1·09	— 1·43	·32	4	10	...	...	...	...	...	...
,,		Omagh (Edenfel)	·85	— 1·62	·32	18	5	76·0	12	31·0	1	1	1

+Shows that the fall was above the average ; —that it was below it.

a—and 23. *b*—and 29. *c*—and 18, 19. *d*—and 12.

METEOROLOGICAL NOTES ON MAY, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

HITCHIN.—This year has yielded the driest five months in the record, which commenced in 1850, R only 5·22 in., of which 3·08 in. fell in March.

ADDINGTON.—The least May rainfall registered in 25 years. From the 1st to the 18th not a drop of R fell, and from April 17th to May 19th only ·06 in. Prevailing winds N.E. One very heavy peal of T on the 20th, and Steeple Claydon Church struck by L. Drought getting very serious at the close of the month.

BURY ST. EDMUNDS, WESTLEY.—A dry month, with harsh winds and almost continuous drought. The rain of the 20th was very partial, many places near having very little. The hay crop is likely to be very short, and if R does not come soon it will be very serious for all crops. T on 13th and 20th.

NORWICH, BRUNDALL.—A very dry month, and rain greatly wanted at the close. An unusual prevalence of N.E. winds, and great range of temp. on some days. On the 12th the temp. fell 23 degrees between 4.30 p.m. and 8.30 p.m., and on the 14th it rose from 34°·4 in the morning to 76° in the afternoon, or a range of 41°·6 in the day; being the greatest diurnal range since observations commenced in 1883. H on 1st and 20th; T at 6 p.m. on 12th; solar halo and faint parhelion at 6.30 p.m. on 6th.

WEYMOUTH, LANGTON HERRING.—The smallest R in any May since 1875, and only 5·00 in. has fallen since the beginning of the year. This is the smallest amount of R for the first five months of the year in 22 years, and is only ·48 per cent. of the average. The mean 9 a.m. temp., 56°·8, is 2°·9 above the average of 24 years, and, with the exception of 1889 and 1893, is the highest in that period. This is the seventh month in succession in which the temp. has been above the average. The drought is beginning to be seriously felt in this neighbourhood, and there has been very little dew. T on the 20th; fog on the 14th; a gale on the 19th; lunar halo on 21st.

TORQUAY, CARY GREEN.—R 2·04 in. below the average. Mean temp. 56°·1, or 3°·0 above the average. Duration of sunshine 296 hours 45 minutes, being 77 hours 5 minutes above the average; no sunless day.

POLAPIT TAMAR [LAUNCESTON].—A most unseasonable month, though fine throughout. The driest month recorded here for over 15 years, and the total for the first five months of the year is 2·24 in. below the average. Fog on the 15th.

WOOLSTASTON.—A warm but exceedingly dry month, with very cold nights. The want of water was severely felt, and the prospects of the hay crop are ruined. R fell very slightly on 6 days only. H and vivid L on the 20th. Mean temp. 54°·7.

TENBURY, ORLETON.—The driest month of May recorded here in 66 years, with the exception of May, 1844, in which month the same quantity of rain fell as this month. The weather was generally bright, with a large percentage of N. and N.E. wind, but the temp. of the month was 2°·5 above the average of 35 years. T on 13th, 18th, and 20th; H on 20th. Temp. above 70° on 9 days.

LEICESTER, BARKBY.—The country looking beautiful, but very dry. Hot days, but chilly nights. Constant N. E. winds. Prospect of fruit destroyed by sharp frost on 1st. First swift seen on 9th. Mean temp. 53°.

WALES.

HAVERFORDWEST.—The rain that was anxiously looked for at the end of April has never come. Excepting 1859 (when no rain fell) this is the driest May in my record, which dates back to 1849. I cannot obtain any record of

May, 1831, but well remember the brightness, absence of R, and heat of that year. Barley in some places has not come up. Except fields that were shut up over the winter, hay crops will be a total failure; currants and fruit generally have withered on the trees, and on shallow lands vegetation is completely burnt up. General character of the days bright, cloudless, and hot, with winds mostly from N.E.; the nights cool, calm, and cloudless, with an unusual number of ground frosts. High bar. throughout the month. Every tree, shrub, and flower so forward that when June comes there will be nothing to come into bloom.

ABERYSTWITH, GOGERDDAN.—Very bright and dry throughout the month, with N.E. winds.

SCOTLAND.

CARGEN.—Exceptionally fine during the month, and unusually warm, very slight rainfall and a large amount of sunshine having been recorded. A notable feature was the high bar. pressure; the mean, 30·203 in., a "record" for May, has only once been exceeded in any month during 37 years (30·332 in. in February, 1891). On only one day (the 27th) was the bar. below 30 inches during the whole 24 hours. The mean bar. pressure of the first five months of this year has reached the unparalleled figure of 30·007 in. The mean temp., 54°·8, is 4° above the average, and the highest recorded in May, the nearest approach to it being 54°·5 in 1889. An unusually warm period prevailed during the 13 days 6th to 18th, when the mean temp. was 57°·5; on the 11th and 12th, the extraordinary high max. of 79° was reached, only exceeded in May, 1864, when on the 18th and 19th 81° and 82° respectively were registered. The range of temp. for the three days 10th to 12th exceeded 34°, and on the 11th was 36°·8; the nights being generally very clear, radiation produced low minima. The somewhat high difference (4°·4) between the readings of the dry and wet is an indication of the very dry state of the atmosphere. The R of the month, ·68 in., has only twice been lower during May, viz., ·60 in. in 1876, and ·06 in. in 1894. Only once, in 1881, when 295 hours were recorded, has this month's amount of sunshine—291 hours—been exceeded. The wind was very light, Easterly and Northerly prevailing for 24 days. Vegetation not so far advanced as the mild winter seemed at one time to promise. Flowering trees and shrubs fully three weeks earlier in bloom than last year.

JEDBURGH, SUNNYSIDE.—The rainfall of the month was remarkably small, E. and N.E. winds prevailing. The day temp. was high, but that of the night low, falling to 36° several times. Vegetation was wonderfully fresh, but the drought began to be felt at the close. The hawthorn was most luxuriant, more so than for a long period. Garden fruits of all kinds very promising.

COLMONELL.—Rainfall 1·84 in. less than the average of 19 years. Mean temp. 54°·1.

LOCHGILPHEAD, KILMORY.—Remarkable for drought, May being often a very wet month. Temp. very variable; a good deal of Northerly wind.

S. RONALDSAY, ROEBERRY.—A fine month, with average rainfall. Mean temp. 50°·5.

IRELAND.

DARRYNANE ABBEY.—The driest month registered here, the next driest being November, 1879, with ·75 in. on 9 days. Very hot also, with light winds and very calm sea.

O'BRIENSBRIDGE, ROSS.—The smallest rainfall here in any month for 50 years, the next to it being May, 1859, with ·34 in. A most beautiful month, with many very warm days, and some slight frosts.

DUBLIN.—A beautiful month, very similar to May, 1895—bright and dry, without any severe night frosts. The amount of cloud is very low, 4·3. The mean temp., 55°·2, is 3°·2 above the average. In the thirty-one years ending with 1895, May was coldest in 1869 (48°·2) and warmest in 1893 (56°·7). Solar

halos were seen on the 13th, 21st, and 24th. Lunar halos on the 9th, and aurora on the 2nd. High winds occurred on 3 days, attaining the force of a gale (from N.N.W.) on the 20th.

OMAGH, EDENFEL.—A very fine month, the cool polar winds of the first week having speedily given way to a week of hot summer weather, when on the 12th the highest shade temp. ever registered here so early in May was recorded. The third week was cool, with considerable rainfall, but no frost, and the remainder of the month was fine, dry, and generally clear. These conditions, following the mild winter, have resulted in foliage and flower of phenomenal luxuriance, both on forest trees and flowering shrubs.

MARSH GAS UNDER ICE.

PROFESSOR IRA REMSEN describes a curious case of the accumulation of marsh gas under ice. A number of skaters were on a large artificial lake covered with ice. In places white spots were noticed in the ice, suggesting air bubbles. A hole was bored in the ice and a match applied. The thin jet of flame burst up, and the gas was found to be marsh gas, formed by the decomposition of organic matter at the bottom of the lake. Professor Remsen suggests that skating ponds illuminated by natural gas are among the possibilities of the future.—*Science.*

THE FLOATING ISLAND IN DERWENTWATER.

The foregoing paragraph is of interest as a contribution towards the facts respecting floating islands. It is curious that Prof. Remsen's lake should give off gas at so low a temperature. We do not expect to see Derwentwater illuminated as the Prof. suggests, because there the generation of gas is slight, except at temperatures at which ice could not exist.

A HIGH-LEVEL OBSERVATORY.

THE Assistant Government Geologist of Victoria, Mr. James Stirling, has just completed the erection of a high-level meteorological observatory at Mount St. Bernard, 5,000 ft. above sea-level. "This," writes the Melbourne *Age*, "is the highest altitude in Australia at which systematic weather observations have been taken. The instruments sent up by the Government Astronomer, Mr. Baracchi, have been placed in charge of Mr. Ellis, of the Hospice, who has been fully instructed in their use by Mr. Stirling. Thermometers, barometer, hygrometers, wind and rain gauges, and other instruments have been supplied. Mr. Stirling has also completed a series of observations on the deepest mines, as Lansell's 180, at Bendigo, over 2,000 ft. below sea-level. These observations on underground temperature, pressure of air, &c., will enable a comparison to be instituted with the recent researches of Professor Agassiz, in America, on the rate of increase of temperature with depth, and also be valuable for determining the best methods of ventilating mines at deep levels."—*Adelaide Advertiser.*

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXVI.] JULY, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

THE INTERNATIONAL CLOUD ATLAS.*

DURING the last quarter of a century, many thousands of photographs of the clouds have been taken by dozens of experts. We did think of enumerating some of the best known workers, but the list would be too long, and would go nearly through the alphabet from Abercromby to Wilson Barker—perhaps even before the one and after the other—so we desist. We naturally expect to see some result from all this work, and cloud literature is growing proportionally.

The publication now before us has, therefore, to reach a very high level in order to occupy a position worthy of the auspices under which it appears, and of the year in which it is published. Some day, some one will, we hope, give a chronological list of all published works on, and illustrations of, cloud formation. We can here take only a few, and, turning them over, state our impressions of the *International Atlas* in comparison with each.

First, of what may be called the modern publications, is M. Weilbach's *Nordeuropas Skyformer* (Copenhagen, 1881), and we are very glad to see that fourteen years later M. Weilbach was elected as a member of the committee to which we are indebted for the new atlas now before us. He can hardly fail to be gratified at the progress which has been made along the lines which he laid down.

About ten years later, came the *Wolken Atlas* (1890) of Drs. Hildebrandsson, Köppen and Neumayer. Had there been more blue and less brown in the colouring of this atlas, it would, we think, have been better received than it was—the forms on some of the plates are very good. Plate 1 (Cirrus) seems to us better than anything in the new atlas. Plate 5 (Alto Stratus) is reproduced in the new atlas as Fig. 7. Plate 9 (Cumulo Nimbus) and its equivalent Fig. 23 in

* The International Meteorological Committee.—International Cloud Atlas, published by order of the Committee by H. Hildebrandsson, A. Riggenbach, L. Teisserenc de Bort, members of the Clouds Commission. Paris: Gauthier-Villars, 1896. 4to, 31 pages; 14 sheets of coloured maps.

the new atlas, each seems to us damaged by the characteristic tone of the respective atlasses. Plate 9 is too grey and Fig. 23 too blue—the forms agree very well. Plate 10 (Stratus) is, we think, better than its equivalent, Fig. 28—we do not know whence the latter gets the colour of the sea. The rest of the illustrations are, we think, all surpassed in the new atlas.

Third in the series comes the *Wolkentafeln* of Dr. Karl Singer (1892), who, like M. Weilbach, has been assisting in the issue of the new atlas. These were all from photographs, and the reproduction was well done. Some are reproduced in the new atlas, and the others are supplanted by better ones.

Fourth, appeared the *Classificazion delle Nubi*, issued in 1893 by the Specola Vaticana, under the direction of Padre Denza, and illustrated by the excellent reproductions of some of Signor Mannucci's photographs. This beautiful work is unique in one respect, viz., that it is not a collection of photographs by various artists, but it gives solely those taken at the observatory at the Vatican. We are sorry that not one of these has been adopted for the new atlas, as whether their nomenclature be or be not perfect, there is, we think, no doubt that several are extremely typical and true to nature, *e.g.*, Tav. viii., Strato-Cumoli 2, and Tav. xi., Nembi 2.

Fifthly and lastly, we come to the work of one who has but lately gone from us—Clement Ley's *Cloudland*, 1894. The coloured illustrations, though probably costly, do not seem to us truthful or happy, but the small reproductions of some of Mr. A. W. Clayden's photographs are very charming. We prefer his Cumulo Nimbus (pp. 87 and 89) to the Figs. 18 and 22 in the new atlas; but doubtless the opinion of the distinguished experts whose work we are noticing is preferable to ours.

And now for a few words in conclusion.

The atlas is very lovely and very cheap; we can, therefore, strongly recommend our readers to procure a copy. In the early plates the sky is more blue than we generally get in London, but that is our misfortune, not the fault of the atlas.

We think that in another edition the paper upon which the plates are printed should be stiffer; these, we fear, will not stand hard use.

We are not sure that the changes of style between several of the plates are advantageous; *e.g.*, an Alto Stratus Fig. 7 is not necessarily brown, nor we believe is a Strato-Cumulus necessarily a night cloud.

Although not one of the 28 reproductions of clouds is from an English photograph, our countrymen may well be content to see how largely the International System of 1896 is based upon the work of Howard, and that the classification adopted is that of the joint work of Dr. Hildebrandsson and their own countryman, the Hon. Ralph Abercromby.

THE WORST GALE OF THE 19TH CENTURY IN THE ENGLISH MIDLANDS.

To the Editor of the Meteorological Magazine.

SIR,—The following notes as supplemental to your report in the May and June numbers may be worth consideration.

I travelled to Ramsgate on the afternoon of March 23rd. From Faversham onwards heavy banks of cloud, rolling over the hills from the Channel, already indicated coming trouble; though over the Thames Estuary and to the north all was bright and clear.

The night was quiet, with a little drizzling rain. At 9 a.m. it was perfectly calm. Soon afterwards the wind suddenly rose from S.W., and by 11 as high a sea was running up Ramsgate Pier as I have ever seen there in many years.

I had occasion to go to Upper Deal, and for want of train service had to drive to Minster. It was as much as we could do to get there in the teeth of the wind. There at noon the storm was raging across the flats of the Stour Valley. I arrived by train at Deal at 12.30, and from then till 1 p.m. the gale was at its height. It took me that half-hour to walk the mile to Upper Deal, struggling with the wind and barely keeping my feet, and sometimes blown against a wall and drenched with rain.

By 1.30 the sun burst out, by 2 p.m. all was calm, and there was no return of the gale. In the quiet of a bright spring afternoon I returned to Ramsgate by 4 p.m., noting on my way trees uprooted and havoc in the farmsteads; but having to return to London that night, I had no time to ascertain details.

Comparing these facts with your map facing p. 65, is is plain that my storm was, though parallel to, well in advance of the Midland gale. While I was experiencing the height of the former at Deal, the latter had only reached Bristol; or, measured parallel to your axis, was 140 miles behind; or, expressed in time, my storm reached the longitude of Cambridge, measured in the same way, 2 hours before the other.

Obviously, therefore, they were quite distinct; but it would be interesting to know whether there was a similar earlier storm on the north side of the main axis; so that the Midland gale might be attributed to the filling up of a vacuum caused by the two precursors.

I note that you have not been supplied with the time of the happening of the damage reported from Shropshire and Staffordshire.

A fortnight later I was at Malvern, and saw the damage spoken of by Mr. Pringle on p. 68. The path of the blast that did the mischief was quite apparent. In a direct line, not appreciably differing from a parallel to that of the "path" on your map, it shot downwards from the summit of the Worcestershire Beacon (1,395 ft.) to a belt of trees near the bottom of Rushy Valley (755 ft.), through which it cut a track, several trees being broken off short about 6 ft. or 8 ft. above the ground; and then it fell on the Priory Church

and Knotsford Lodge (400 ft.). The summit of the Beacon is, measured horizontally, 3,000 ft. from the Priory, so that the wind was deflected downward at an inclination of 1 in 3, or an angle of 18°. Measurements to the belt of trees give the same results.

Yours obediently,

JAMES G. WOOD.

115, *Sutherland Avenue, W. July 4th*, 1896.

THE SPRING DROUGHT OF 1896.

DURING the last two or three months there has been much talk of drought, but as at the end of May it was at its greatest intensity, we left its consideration until the June returns were received.

It is frequently difficult to obtain by ordinary methods a just appreciation of natural phenomena, and we have had considerable difficulty in arriving at a clear idea of, and in exhibiting in tabular form, the intensity of the drought. One reason of this is given in a remark of the veteran observer, Mr. Southall of Ross: "We have had two periods of partial drought, with a period of 45 days slightly below average, between them." Normally, we should have expected the period dividing two droughts to have more than the average fall. Again, in working with the records for the half-year, the two-month periods, January and February and April and May, were dry, but not unprecedentedly so, and were separated by a wet March, and followed by a June of irregular amounts, but generally wet, except over central and western England.

In preparing the following table, 28 stations were selected for their fair geographical distribution over the kingdom, and should therefore give reliable results for the country generally.

Dealing first with the rainfall of the half-year, we see that at eight out of the sixteen English and Welsh stations the total fell below 67 per cent., or two-thirds of the average, the lowest values being 48 per cent. at Haverfordwest, Pembroke, 52 per cent. at Orleton, Worcestershire, 55 per cent. at Weymouth, and 56 per cent. at Hesley Hall, Notts, while at Bury St. Edmunds the fall was 10 per cent. above the average. In the *Met. Mag.* for July, 1895, we showed that the rainfall of the driest first six months should be about 50 per cent. of the average; the above-mentioned stations therefore show a six months' drought of extreme severity, but the average of the whole 16 stations shows a deficiency of only 30 per cent., an amount by no means phenomenal.

Div.	Station.	First Half of Year.			April & May.		
		Average	1896		Average	1896	
			Total.	% of Aver		Total.	% of Aver
		in.	in.		in	in.	
I.	London, Camden Square	10·76	7·24	67	3·64	·69	19
II.	Alton, Ashdell	13·60	10·81	79	4·16	·71	17
III.	Winslow, Addington.....	11·57	7·36	64	4·02	1·14	28
IV.	Bury St. Edmunds, Westley..	9 78	10·78	110	3·41	1·46	43
V.	Weymouth, Langton Herring.	12·56	6·91	55	3·49	·82	23
,,	Polapit Tamar [Launceston]...	15·08	8·97	59	4·05	·90	22
VI.	Tenbury, Orleton	13·94	7·23	52	4·63	1·44	31
VII.	Boston	9·93	6·89	69	3·43	1·44	42
,,	Hesley Hall [Tickhill]	10·84	6·02	56	3·75	1·22	33
VIII.	Manchester, Plymouth Grove.	13·44	11 22	83	4·06	2·29	56
IX.	Wetherby, Ribston	11·22	6·81	61	3·80	1·19	31
X.	Newcastle, Town Moor.....	11·06	7·98	72	3·58	1·47	41
,,	Seathwaite	57·65	53·60	93	15 75	6 84	43
XI.	Cardiff, Ely	17·15	11·34	66	5·26	1·15	22
,,	Haverfordwest	19·33	9·35	48	4·99	1·22	24
,,	Llandudno	11·79	10·42	88	3·74	1·88	50
XII.	Cargen [Dumfries]	17·42	14·97	86	4·75	2·66	56
,,	Jedburgh, Sunnyside.....	10·53	8·19	78	3·60	1·63	45
XV.	Lochgilphead, Kilmory.....	25·05	26·73	107	6·16	5·26	85
XVI.	Dundee, Eastern Necropolis..	11·68	7·20	62	3·71	1·60	43
XVII.	Braemar	15·51	10·06	65	4·83	2·03	42
XVIII.	Cawdor [Nairn]	11·11	11·19	101	3·27	2·14	65
XXI.	Carlow, Browne's Hill	14·81	9·01	61	4·62	·70	15
,,	Dublin, Fitzwilliam Sq.	11·93	7 85	66	4·05	1·07	26
XXII.	Ballinasloe	15·82	11·46	72	5·03	1·26	25
,,	Crossmolina, Enniscoe	21·84	19·41	89	5·98	3·01	50
XXIII.	Waringstown	14·38	10·94	76	4·86	1·58	33
,,	Londonderry, Creggan Res....	16·36	18·92	116	4·76	4·12	87

For the Scotch and Irish stations the averages work out at 83 per cent. and 80 per cent. respectively, and do not in any instance fall to 60 per cent. of the average.

Turning now to the second portion of the table, containing the results for April and May, we find three stations with less than 20 per cent. of the average, *i.e.*, Carlow, Browne's Hill, 15 per cent., Alton, Ashdell, 17 per cent., and London, Camden Square, 19 per cent. These instances certainly give small totals, but in each case the rainfall exceeded the partial drought limit of ·01 in. per diem, while in 1893 there were dozens of stations at which partial drought lasted for more than 100 days. In connection with this we may mention that we tabulated the absolute and partial droughts for 28 stations well distributed over the three kingdoms, but the results were not of sufficient importance to justify their publication in full, the absolute drought extending to three weeks at only three stations. The partial drought reached or exceeded 50 days at four stations in England and two in Ireland: —

London, Camden Square.....	51	days	ending	June	2nd,	rain ·46 in.
Alton, Ashdell	50	,,	,,	,,	3rd,	,, ·45 ,,
Weymouth, Langton Herring...	51	,,	,,	,,	3rd,	,, ·40 ,,
Launceston, Polapit Tamar ...	52	,,	,,	,,	4th,	,, ·49 ,,
Cork, Wellesley Terrace	64	,,	,,	,,	1st,	,, ·63 ,,
Dublin, Fitzwilliam Square ...	60	,,	,,	,,	15th,	,, ·58 ,,

Of these by far the most remarkable is the 64 days at Cork.

Leaving now results based on geographical distribution to represent the country as a whole, and selecting the individual stations which give the most striking results, we find that out of a little over three hundred returns received, 53, set out in the following table, recorded less than two-tenths of an inch of rain in May, while for April and May together four stations recorded less than half an inch, viz.: Torquay, Cary Green, ·13 in.; Plymouth, ·29 in.; Ashburton, Druid House, ·35 in.; Caher, Duneske, ·43 in.

Total Rainfall in May, 1896.

I.	London, Strand.....	·14	
,,	,, Camden Square...	·14	
,,	,, Randolph Gardns.	·18	
,,	Lea Bridge.....	·19	
II.	Wallington.....	·15	
,,	Hythe	·17	
,,	Sevenoaks, Kemsing	·15	
,,	St. Peter's.....	·08	
,,	Sheppey, Leysdown.....	·12	
III.	Goring.....	·18	
,,	Oxford, Magdalen College.	·19	
IV.	Southend, Water works ...	·19	
V.	Marlborough, Mildenhall..	·19	
,,	Weymouth, Langton Herrg.	·15	
,,	Plymouth	·01	
,,	Torquay, Cary Green.....*	·03	
,,	Ashburton, Holne Vic. ...	·02	
,,	,, Druid House..	·01	
,,	Tavistock, Rose Villa	·09	
,,	PolapitTamar[Launceston]	·07	
,,	Okehampton, Oaklands ...	·07	
,,	Tiverton, St. Peter St.....	·05	
,,	Hartland Abbey	·07	
,,	Barnstaple Athenæum.....	·05	
,,	Lynmouth, Glenthorne ...	·08	
,,	Probus, Lamellyn	·05	
,,	Liskeard, Wadeland Ter..	·04	
V.	Wellington, The Avenue *	·07	
,,	Templecombe, Stowell Rec.	·17	
VI.	Lechlade	·15	
,,	Ross, The Graig	·18	
,,	Stourport, Lincombe Lock	·15	
XI.	Cardiff, Ely	·14	
,,	Treherbert, Tynywaun ...	·13	
,,	Llandovery	·05	
,,	Haverfordwest, High St...	·06	
,,	St. Bride's Bay, Penycwm.	·06	
,,	Castle Malgwyn [Llechryd]	·17	
,,	Tregaron Vicarage	·18	
,,	Builth, Abergwesyn	·11	
,,	Rhayader, Tyrmynydd ...	·13	
,,	,, Nantgwillt	·11	
,,	Lake Vyrnwy	·19	
XX.	Dunmanway, Coolkelure..	·10	
,,	Cork, Wellesley Terrace..*	·14	
,,	,, St. Ann's Hill.....	·14	
,,	Waterville, Iveragh Lodge	·17	
,,	Caher, Duneske .....*	·02	
,,	Ballingarry, Hazelfort.....	·16	
XXI.	Gorey, Courtown House..*	·15	
,,	Carlow, Browne's Hill.....	·12	
,,	Dublin, Fitzwilliam Sq. ...	·19	
XXIII.	Warrenpoint, Sumner Hill.	·17	

* Total Rainfall in April less than ·50 in.

It will be seen that out of the 53 stations in the table, 31 are in Divisions V., VI., and XI., that is, in the S.W. quarter of England and the southern half of Wales, districts for the most part decidedly wet, and where such falls are much more remarkable than they would be in the Eastern Counties, while nine are from southern Ireland, also a wet region.

The longest droughts yielded in these districts are—

		Absolute.	Partial.
V.	Torquay, Cary Green	26 days	75 days.
,,	Ashburton, Druid	22 ,, ...	69 ,,
,,	,, Holne Vicarage	21 ,, ...	67 ,,
,,	Wellington, The Avenue	20 ,, ...	65 ,,
VI.	Lechlade	19 ,, ...	69 ,,
XI.	Haverfordwest	22 ,, ...	51 ,,
,,	St. Bride's Bay, Penycwm	21 ,, ...	51 ,,
XX.	Caher, Duneske	none	66 ,,
,,	Cork, Wellesley Terrace	none	64 ,,

Referring again to 1893, we find partial droughts of 76 days at Torquay, 78 days at St. Austell, 78 days at Ross, Herefordshire, and 73 days at Haverfordwest, showing clearly that in S.W. England and S. Wales the drought was more severe in 1893 than in 1896, but the 1896 drought in the south of Ireland appears to be altogether unprecedented, for we can find no previous record of partial drought in that region prevailing for more than 45 or 46 days.

We conclude with a few notes from our regular correspondents, and one or two extracts from the press :—

Kensington, Edith Road.—Absolute drought for 32 days, April 18th to May 19th. G. VON U. SEARLE.

London, Strand.—From April 18th to June 2nd, rain was registered on only three days—April 30th, ·04 in. ; May 22nd, ·12 in. ; May 23rd, ·02 in. J. H. STEWARD.

Muswell Hill.—The total R of the six months January to June is 6·98 in., being 4·81 in., or over 40 per cent., less than the average. S. G. ABETHELL.

Finchley, Etchingham Park.—From April 17th to June 3rd, 48 days with only ·34 in. of R. J. W. SCOTT.

Dorking, Abinger Hall.—The total rainfall for the half-year is under ten inches, which is very little. G. PAYNE.

Tenterden.—The drought is serious. Absolute drought for 20 days, April 30th to May 19th. Partial drought 57 days, April 5th to May 31st; rainfall ·56 in. Total in May ·21 in., and in April and May ·75 in. June, however, has been the wettest for 34 years, and has given us 3·95 in., chiefly in five heavy falls, viz. : 4th, ·21 in. ; 9th, ·60 in. ; 10th, 1·26 in. ; 24th, 1·10 in. ; 29th, ·40 in. J. ELLIS MACE.

Tunbridge Wells, Camden Park.—Absolute drought for 18 days, between May 1st and 20th, and partial drought for 33 days, with ·33 in. of R between January 27th and March 1st. Rainfall for the first five months of 1896, 5·44 in. ; average for 12 years, 10·28 in. J. WESTON.

Maidstone, Debtling.—My well, 100 feet deep in the chalk, is now (June 4th) lower than I have ever known it at this time of year, having only 9 ft. 6 in. of water in it, while it generally has from 13 ft. to 20 ft. Absolute drought for 17 days, ending May 19th, and partial drought for 29 days, with ·21 in. of R, ending May 31st. R. COOKE.

Sheppey, Leysdown.—Total R for June, 3·13 in., or only ·11 in. less than in the previous five months. A. FARBROTHER.

Slough, Upton.—The R for the half-year (6·23 in.), despite a wet March, is less than half the normal quantity. R. BENTLEY.

Amersham, The Plantation.—Absolute drought for 33 days, from April 18th to May 20th inclusive. G. WELLER.

Plymouth.—Absolute drought occurred from April 25th to May 21st, and in 69 days, ending May 30th, only ·65 in. of R fell. H. VICTOR PRIGG.

Ashburton, Holne Vicarage.—R from January 1st to June 30th only 14·71 in., 7·51 in. less than the average of the corresponding period of the preceding six years. J. GILL.

Clifton, Pembroke Road.—R of the first six months of the year only 6·98 in., being nearly 8·00 in. less than the average of 40 years. R. F. STURGE.

Ross, The Graig.—The rainfall for the five months ending May 31st, 1896, is only 3·84 in., or 7·98 in. less than the average of the ten years 1880-89. The following are the amounts registered in Herefordshire in the first five months of the ten driest years since 1818 :—

1896 3·84 in.	1870 7·23 in.	1854 7·26 in.	1892 7·55 in.	1863 7·72 in.
1893 7·11 ,,	1864 7·23 ,,	1855 7·31 ,,	1832 7·65 ,,	1839 7·72 ,,

Although the fall in 1896 is much less than in 1893, there was in the latter year a period of 73 days with only ·33 in. of R. This year we have had partial drought for 62 days, ending February 29th, and for 50 days, ending June 3rd. H. SOUTHALL.

Rotherby Hall.—Total rainfall for five months, ending May 31st, 1896, 5·11 in., the smallest since 1868, and 3·01 in. less than in the corresponding period of 1895. J. HAMES.

Neston, Hinderton.—Rainfall, January to June, 1896, 11·20 in. Average, January to June, 1869-95, 11·07 in. R. BUSHELL.

Bolton, The Park.—Rainfall of the first six months of 1896, 16·67 in.; average for the same period for ten years, 14·98 in. W. W. MIDGLEY.

Duddon Valley, Ulpha Vicarage.—The R of the six months ending June is in excess of the average by 1·48 in. W. KEWLEY.

Dunmanway, Coolkelure.—A very great scarcity of water in rivers and streams, which are lower than any one can remember them. E. A. SHULDHAM.

Cork, Wellesley Terrace.—The R of the first half of the year is 8·43 in., compared with an average of 18·66 in.; the next smallest fall was 9·57 in. in 1887. There was partial drought for 53 days, ending June 1st. W. MILLER.

SLOUGH.—June 6th.—The drought is very serious. The ponds on the high grounds are dried up, and the cattle have to be watered by carts. Hay will not be half the average, and cherries, plums, damsons, and apples have suffered.—*Daily Mail.*

DEVON.—A remarkable drought is being experienced in Devon and Cornwall, and the water supply of Plymouth and other towns has become so short that even water required for domestic purposes is only turned on for a limited period. With the exception of a slight rainfall at the beginning of last month,

the drought has lasted since the middle of March. No such scarcity of water has been experienced since 1869. The total rainfall for the six months of the present year is less than eight inches. Agriculturists are suffering severely.—*Bristol Times and Mirror*, July 1st.

While dealing with the first six months of 1896, it seems unreasonable to entirely ignore the unusual warmth which accompanied the drought, for although our time is chiefly devoted to rainfall statistics, and we receive practically no systematic temperature records, the observations at Camden Square now extend over nearly 40 years, and we have therefore full details of the temperature of North London.

Taking first the mean shade temp. at 9 a.m., we have—

Average of 30 years, 1861–90...	Jan.	Feb.	Mar.	April.	May.	June.	Six months, Jan.-June.
	38°1	39°7	41°6	48°7	55°0	61°2	47°4
1896	40·3	38·9	45·8	50·2	55·7	64·8	49·3
Difference	+2·2	—·08	+4·2	+1·5	+0·7	+3·6	+1·9

It will be seen that the mean for the six months is 1°·9 above the average, and that only in February was the temperature below the average.

In recent years, 1878, 1884, and 1893 appear to have been the warmest, and we therefore give similar results for those years, from which it will be seen that the mean for the first half of 1896 is half a degree above that of the next warmest year, *i.e.*, 1893 :—

Mean shade temp. at 9 a.m.

	Jan.	Feb.	Mar.	April.	May.	June.	Mean.
1878	39°6	+41°6	—42°3	48°9	56°6	62°8	—48°6
1884	+43·3	+41·6	43·3	—47·0	56·7	—59·8	—48·6
1893	—35 0	40·9	44·2	+50·8	+58·9	62·5	48·7
1896	40·3	—38·9	+45·8	50·2	—55·7	+64·8	+49·3

The + and — indicate respectively the highest and lowest value for each month.

but that in only two months, March and June, was the 1896 value higher than that of the corresponding month in one of the other years, while in February and May the 1896 values are the lowest.

If we take the extreme max. in shade and min. in shade for each of the months, we have—

Absolute shade max. and shade min. in 1896.

	Jan.	Feb.	Mar.	April.	May.	June.
Max.	52°7	55°8	65°2	68°4	78°9	85°1
Min.	28·0	23·2	29·4	32·8	36·1	41·1

Number of times that the shade max. and shade min. have been higher in the 30 *years* 1861–1890.

	Jan.	Feb.	Mar.	April.	May.	June.	Mean.
Max.	21	14	4	17	15	9	13
Min.	4	19	0	4	6	19	9

If the max. and min. had been average values, they should, of course, each have been exceeded 15 times in the 30 years, and the 13 for the max. is very near to this; the 9 for the min. is decidedly low, but not remarkably so.

The conclusion which we draw, and which we think is clearly borne out by the foregoing, is that 1896 has been marked by steady persistence of temperature slightly above the average, and not by periods of exceptionally high temp.

ROYAL METEOROLOGICAL SOCIETY.

The last meeting of this Society for the present session was held on Wednesday evening, June 17th, at the Institution of Civil Engineers, Westminster, Mr. E. Mawley, F.R.H.S., President, in the chair.

Mr. H. Harries read a paper on *Arctic Hail and Thunderstorms*, in which he showed that the commonly accepted opinion that hail and thunderstorms are almost, if not quite, unknown in the arctic regions, is incorrect. The author took the first hundred logs that came to hand, ranging over the greater part of the present century; eight were discarded owing to the letter "h" being used indifferently for hail and for haze; out of the remaining 92, 73, or 79 per cent. contained records of hail. The observations being distributed over all parts of the northern seas visited by ships.

There were in all 296 observations, one-half of which were recorded to the northward of the 66th parallel, but any discussion of the distribution throughout the different months of the year is vitiated by the fact that vessels wintering far north are very few in number, so that there is an almost complete absence of observations from November to February.

As bearing upon the question of the probability of hail in high latitudes, it is significant that not one of the observers expresses surprise indicative of the phenomenon being rare.

Turning to thunderstorms, it will perhaps be expected that the 296 records of hail would be accompanied by as many records of thunderstorms. It may be that the atmosphere was in an electrical condition with each fall of hail, but instead of about 300 observations of thunder or lightning, or both, the total number is only 59, or one-fifth of the number of hail falls. More than half the number occurred in August, but the absence of ships in winter must again be borne in mind.

The observations show that thunderstorms are at least possible in all regions from the Behring Strait, Eastward, to Davis Strait, and the East Greenland Sea.

Mr. R. H. Scott remarked that probably many of the recorded observations of hail were "graupel," and not real hail. Mr. Baldwin Latham asked if anything is known as to the height at which hail is formed, he remembered a severe storm in which he saw the stones

three-quarters of an inch in diameter falling gently on his lawn, and no damage was done, while in the valley, 300 feet below him, every pane of glass was broken. The President, and Messrs. Inwards, Tripp, Marriott and Harding also took part in the discussion.

A paper by Mr. J. E. Cullum on the *Climatology of Valencia Island* was also read. The Observatory at Valencia, which is under the control of the Meteorological Office, is situated on the extreme south-west coast of Ireland, and is almost the most westerly point of Europe. Continuous records from self-recording instruments were carried on from 1869 until 1891, when the observatory was removed to Cahirciveen, and the author gives the results of the observations for those 23 years, dealing with the elements:—

Barometrical Pressure.	Rain.
Temperature.	Snow and Hail.
Vapour Tension.	Thunder.
Relative Humidity.	Fog.

Sunshine.

The paper being practically a summary of results, is incapable of sufficient condensation to give an adequate idea of it in these pages.

The President remarked on the very equable character of the records, and thought that greater range would have been shown by ordinary instruments exposed in the usual manner.

Mr. Balwin Latham asked if the results of the recording instruments had been compared with readings in the Stevenson screen which he saw in one of the photographs of the station.

Mr. F. C. Bayard thought that a comparison of the records at Belmullet in the N.W. of Ireland, with those at Valencia in the S.W., would be very interesting.

Mr. F. J. Brodie regretted that there was no discussion of the wind records, or of the distribution of gales throughout the year, and no attempt to correlate the results for the different elements. He noticed that thunderstorms were most frequent in winter, while in England they were most common in summer. The range of total annual rainfall, from 69 inches to 44 inches, struck him as very small, for in London the range in the same period was from 32 inches to 17 inches.

Mr. Sowerby Wallis considered the small variation of the rainfall very remarkable, for it is almost axiomatic that in England the rainfall of the wettest year will be roughly twice that of the driest year, and an exhaustive paper read by Mr. A. R. Binnie, C.E., before the Institution of Civil Engineers, in 1892, showed that the same rule held good for the greater part of the world.

Mr. R. H. Scott explained that the paper was entirely a discussion of the results from the self-recording instruments, and said that the comparison of the records at Valencia and Belmullet referred to by Mr. Bayard, would soon be possible, as the observations at the latter station had been worked up and would shortly be issued.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JANUARY, 1896.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	52·7	17	28·0	20	45·4	36·5	37·8	89	72·6	24·3	·78	9	8·1
Malta	64·0	1	40·1	21	58·3	48·0	41·5	75	114·4	33·0	3·05	15	6·2
Mauritius	84·5	30	68·7	27	82·8	73·1	69·7	79	134·8	62·2	8·92	18	6·2
Calcutta	82·9	16	47·5	11	78·4	53·5	50·6	60	135·8	38·7	·03	1	3·4
Bombay	88·7	2	65·8	19	84·0	69·7	65·2	68	134·9	53·2	·00	0	0·2
Ceylon, Colombo	90·5	25	69·5	13	87·8	72·7	68·7	73	152·0	65·0	2·92	8	6·1
Melbourne	108 0	23	45·4	30	80·0	57·2	53·0	61	155·0	35·1	2·61	10	4·9
Adelaide	111·2	23	52·5	29	86·9	62·9	52·0	45	172·0	41·5	1·52	7	4·8
Sydney	108·5	13	63·2	30	84·5	68·2	62·0	70	160·9	52·3	1·66	11	5·2
Wellington	77·0	16	45·5	21	70·5	57·5	52·6	66	141·0	35·0	2·09	11	4·2
Auckland	83·0	30	53·0	21	73·7	60·0	56·8	71	144·0	50·0	·87	12	5·6
Jamaica, Kingston	89·5	3	62·7	15	84·6	67·5	65·2	76	...	...	1·51	7	3·0
Trinidad	88·0	10*a*	63·0	27	85·8	67·5	69·3	80	166·0	62·0	7·08	11	...
Grenada	85·4	30	69·2	24	81·8	72·0	68·7	79	155·8	...	4·35	15	2·3
Toronto	37·4	2	—10·5	6	27·9	15·4	20·0	84	53·5	—15·5	3·93	13	8·3
New Brunswick, Fredericton	37·9	3	—16·3	6	21·2	4·0	7·7	72	...	...	1·36	8	5·7
Manitoba, Winnipeg	34·8	10	—45·2	4	9·4	—16·8	...	...	...	...	1·03	14	5·2
British Columbia, Esquimalt	55·1	7	20·6	2	43·0	34·2	37·1	93	...	...	8·23	20	7·9

a—and 11, 13.

REMARKS.

MALTA.—Adopted mean temp. 52°·1, 0°·8 below the average. Mean hourly velocity of wind 12·4 miles. Average temp. of sea 59°·6. Thunderstorms on 25th and 26th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·9 below, of dew point 0°·1 below, and rainfall 1·59 in. above, their respective averages. Mean hourly velocity of wind 10·2 miles, or 1·1 mile below average; extremes, 26·0 on 24th, and 0·0 on 11th; prevailing direction, E.S.E. to E. by N. Lightning on 16th, 19th, and 30th, and thunder on 31st. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms occurred on the 8th. D. G. MANTELL

Melbourne.—Max. temp. in shade (108°·0 on 23rd) the highest recorded since January 19th, 1882. P. BARRACHI.

Adelaide.—Mean temp. 0°·5 above the average of 39 years; rainfall ·69 in. above the average. C. TODD, F.R.S.

Sydney.—The hottest January on record, and the 13th the hottest day in Sydney on record, and at the same time the most persistent heat. Mean temp. 4°·9 above, humidity 2·5 below, and rainfall 2·03 in. below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Very strong winds from N.W. throughout the month, with occasional rain, but a small total fall. Thunder on 4th, 7th, and 8th; fog on 25th and 26th. Mean temp. 1°·4 above, and rainfall 1·82 in. below, the average. R. B. GORE.

Auckland.—A remarkably dry month, the total rainfall being hardly one-third of the average. Mean temp. slightly below the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—In Kingston the weather was fine, with rainfall about the average. Mean hourly velocity of wind 3·6 miles. Rainfall of the Island one-fourth above the average. R. JOHNSTONE.

TRINIDAD.—Rainfall 4·14 in. above the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, JUNE, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	3 69	XI.	Lake Vyrnwy	2·37
,,	Birchington, Thor	3·76	,,	Corwen, Rhug	2·33
,,	Hailsham	3·86	,,	Carnarvon, Cocksidia ...	...
,,	Ryde, Thornbrough	2·45	,,	I. of Man, Douglas	3·19
,,	Emsworth, Redlands ...	1·77	XII.	Stoneykirk, Ardwell Ho.	4·34
,,	Alton, Ashdell	3·92	,,	New Galloway, Glenlee	3·69
III.	Oxford, Magdalen Col..	2·44	,,	Lilliesleaf, Riddell	2·28
,,	Banbury, Bloxham	2·40	XIII.	N. Esk Res. [Penicuick]	3·75
,,	Northampton, Sedgebrook	2·56	,,	Edinburgh, Blacket Pl..	3·57
,,	Alconbury	1·10	XIV.	Glasgow, Queen's Park..	4·07
,,	Wisbech, Bank House...	2·16	XV.	Inverary, Newtown	4·43
IV.	Southend	2·78	,,	Oban, The Corran	...
,,	Harlow, Sheering..... ...	2·86	,,	Islay, Gruinart Schools..	3·06
,,	Colchester, Lexden	2·01	XVI.	Dollar.....	3·88
,,	Rendlesham Hall	1·67	,,	Balquhidder, Stronvar...	5·59
,,	Diss	...	,,	Ballinluig	3·42
,,	Swaffham	2·18	,,	Dalnaspidal H.R.S.....	4·65
V.	Salisbury, Alderbury ...	1·90	XVII.	Keith H.R.S.....	3·00
,,	Bishop's Cannings	1·55	,,	Forres H.R.S.	3·13
,,	Blandford, Whatcombe .	2·44	XVIII.	Fearn, Lower Pitkerrie..	3·36
,,	Ashburton, Holne Vic...	3·22	,,	N. Uist, Loch Maddy ...	4·18
,,	Okehampton, Oaklands.	2·15	,,	Invergarry.....	3·25
,,	Hartland Abbey	1·73	,,	Aviemore H.R.S.	3·35
,,	Lynmouth, Glenthorne.	2·79	,,	Loch Ness, Drumnadrochit	3·55
,,	Probus, Lamellyn	1·24	XIX.	Invershin	3·37
,,	Wellington, The Avenue	2·83	,,	Scourie	3·98
,,	Wincanton, Stowell Rec.	1·97	,,	Watten H.R.S.....	2·46
VI.	Clifton, Pembroke Road	1·33	XX.	Dunmanway, Coolkelure	4·16
,,	Ross, The Graig	2·19	,,	Cork, Wellesley Terrace	2·17
,,	Wem, Clive Vicarage ...	1·90	,,	Killarney, Woodlawn ...	2 84
,,	Cheadle, The Heath Ho.	3·09	,,	Caher, Duneske	2·03
,,	Worcester, Diglis Lock	1·69	,,	Ballingarry, Hazelfort...	2·12
,,	Coventry, Coundon	2·72	,,	Limerick, Kilcornan ...	1·75
VII.	Ketton Hall [Stamford]	2·52	,,	Ennis.....	...
,,	Grantham, Stainby	2·99	,,	Miltown Malbay	3·01
,,	Horncastle, Bucknall ...	1·91	XXI.	Gorey, Courtown House	1.45
,,	Worksop, Hodsck Priory	4·22	,,	Athlone, Twyford	2·24
VIII.	Neston, Hinderton	4·13	,,	Mullingar, Belvedere ...	2·53
,,	Southport, Hesketh Park	1·98	,,	Longford, Currygrane...	2·99
,,	Broughton-in-Furness ...	4·20	XXII.	Woodlawn	3·36
IX.	Ripon, Mickley.....	3·30	,,	Crossmolina, Enniscoe ..	4·68
,,	Melmerby, Baldersby ...	2·86	,,	Collooney, Markree Obs.	3·46
,,	Scarborough, Obs.	1·46	,,	Ballinamore, Lawderdale	4·32
,,	Middleton, Mickleton ...	3·54	XXIII.	Lough Sheelin, Arley...	4·27
X.	Haltwhistle, Unthank...	2·35	,,	Warrenpoint.....	3·51
,,	Bamburgh	1·26	,,	Seaforde.....	3·73
,,	Keswick, The Bank	3·91	,,	Belfast, Springfield	3·67
XI.	Llanfrechfa Grange	2·51	,,	Bushmills, Dundarave..	2·99
,,	Llandovery	2·80	,,	Stewartstown	3·80
,,	Castle Malgwyn	1·05	,,	Killybegs	4·02
,,	Builth, Abergwesyn Vic.	2·72	,,	Lough Swilly, Carrablagh	3·64
,,	Rhayader, Nantgwillt...	2·12			

JUNE, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which '01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·27	+ ·26	·70	3	11	85·1	15	41·1	1	0	0
II.		Maidstone (Hunton Court)...	3·72	+ 2·10	1·42	10	9	...	...	...	...	...	...
,,		Strathfieldsaye	2·95	...	1·62	10	14	...	...	...	...	...	...
III.		Hitchin	1·59	— ·27	·46	10	10	84·0	15	44·0	1	0	...
,,		Winslow (Addington)	2·15	+ ·29	·54	7	14	85·0	16	39·0	1	0	...
IV.		Bury St. Edmunds (Westley)	3·20	+ 1·41	·94	10	10	76·0	15	44·0	1	0	...
,,		Norwich (Brundall)	2·24	...	·89	9	8	81·0	16	36·8	1	0	1
V.		Weymouth(LangtonHerring)	1·91	— ·32	·54	8	9	79·0	14	47·0	1	0	...
,,		Torquay (Cary Green)	1·97	...	·41	8	12	78·8	8	46·8	1	0	0
,,		Polapit Tamar [Launceston]..	1·49	— ·72	·29	15*a*	14	83·0	15	41·3	1	0	...
VI.		Stroud (Upfield)	2·80	+ ·41	·68	5	14	83·0	15*a*	52·0	29	0	...
,,		ChurchStretton(Woolstaston)	1·96	— ·59	·56	3	14	80·0	15	46·0	1	0	0
,,		Tenbury (Orleton)	1·64	— ·97	·46	7	13	85·5	16	42·5	22	0	0
VII.		Leicester (Barkby)	2·05	— ·30	·38	24	14	88·0	16	39·0	21	0	0
,,		Boston	1·84	— ·05	·45	16*b*	9	86·0	13	45·0	1	0	...
,,		Hesley Hall [Tickhill].....	2·01	+ ·09	·63	4	12	86·0	16	53·0	7	0	...
VIII.		Manchester(PlymouthGrove)	2·50	— ·15	·40	8	15	89·0	15	47·0	21	0	...
IX.		Wetherby (Ribston Hall) ..	2·87	+ ·98	·65	8	10	...	...	...	...	...	...
,,		Skipton (Arncliffe)	4·07	+ ·71	·95	4	12	..	...	...	...	...	...
,,		Hull (Pearson Park).	2·83	+ 1·08	1·29	4	13	80·0	13*a*	...	...	...	...
X.		Newcastle (Town Moor)	2·08	+ ·44	·61	6	16	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	6·50	— ·08	1·19	30	18	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	2·64	+ ·21	·67	7	11	...	...	...	...	...	...
,,		Haverfordwest	1·46	— 1·10	·59	16	13	86·1	15	39·7	1	0	1
,,		Aberystwith (Gogerddan) ...	2·20	...	·34	8	13	88·0	15	35·0	1	0	...
,,		Llandudno.....	2·17	+ ·40	·60	4	16	80·0	15	44·8	1	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	3·44	+ 1·49	·94	4	12	82·6	14	37·0	1	0	...
,,		Jedburgh (Sunnyside).....	1·90	+ ·16	·65	4	12	86·0	15	38·0	1	0	...
XIV.		Colmonell	4·28	...	·76	4	15	89·0	14	40·0	8	0	...
XV.		Lochgilphead (Kilmory).....	3·75	+ ·65	·85	4	18	...	...	41·0	21	0	...
,,		Mull (Quinish).....	4·82	+ 1·53	·70	19	22	...	...	...	...	...	...
XVI.		Loch Leven Sluices	3·50	+ 1·75	·80	5	14	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	2·65	+ 1·15	·40	17	21	78·0	27	42·0	1	0	...
XVII.		Braemar	3·01	+ 1·02	·65	7	19	76·2	15	39·2	26	0	...
,,		Aberdeen (Cranford)	3·00	...	·50	5	22	75·0	27	42·0	20	0	..
XVIII		Strathconan [Beauly]	5·03	+ 2·54	·93	22	16	...	...	...	...	...	...
,,		Gleucarron Lodge.....	7·20	...	1·10	19	23	74·1	15	41·4	5	0	...
,,		Cawdor	4·49	+ 3·09	·70	10	24	...	...	...	...	..	...
XIX.		Dunrobin	4·16	+ 2·14	·88	10	16	71·0	27	44 0	6	0	...
,,		S. Ronaldsay (Roeberry).....	2·89	+ 1·13	·81	29	17	68·0	27	43·0	3, 4*d*	0	...
XX.	IRELAND.	Darrynane Abbey.....	2 30	...	·69	15	20	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	1·93	— ·14	·82	16	10	82·0	15	44·0	4, 5,	0	...
,,		O'Briensbridge (Ross)	2·45	...	·51	15	15	..	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	2·23	+ ·39	·86	16	10	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·88	+ ·22	·70	16	14	80·8	15	49·1	1	0	0
XXII.		Ballinasloe	2·61	+ ·31	·41	3	17	78·0	14	43·0	26	0	...
,,		Clifden (Kylemore)	4·23	...	·62	22	21	...	...	...	...	..	...
XXIII		Waringstown	2·54	+ ·47	·57	16	13	88·0	14	40·0	6, 9	0	...
,,		Londonderry (Creggan Res.).	3·97	+ 1·55	·71	16	23	...	...	...	...	...	...
,,		Omagh (Edenfel)	3·39	+ ·92	·92	16	20	79·0	14*c*	42 0	18*e*	0	...

+Shows that the fall was above the average ; —that it was below it.

a—and 16. *b*—and 23. *c*—and 15. *d*—and 5. *e*—and 25.

METEOROLOGICAL NOTES ON JUNE, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

STRATHFIELDSAYE.—Severe TS with 1·62 in. of R on 10th, but no damage done.

ADDINGTON.—Thunder was rather frequent in the early part of the month, but at no time heavy. Very hot on the 15th and 16th, followed by a great fall of temp. on the 17th, there being a difference of 18° between the max. temp. of the 16th and 17th. There was a good deal of very fine weather during the month with a good rainfall, but R was much needed at the close.

BURY ST. EDMUNDS, WESTLEY.—A favourable month for agriculture. Max. temp. below 60° on only 3 days. The storms were very partial, many places wanting rain. TSS on 3rd, 6th, 9th and 24th, distant T on the 4th.

NORWICH, BRUNDALL.—The warmest June since 1877; mean temp. 61°·7. A great many very fine days. The heavy rain of the 10th was much appreciated after the long-continued dryness. L in evenings of 2nd, 5th and 6th. T on 23rd and 24th. TSS and heavy R on 10th.

WEYMOUTH, LANGTON HERRING.—Mean 9 a.m. temp. 62°·6, or 2°·3 above the average, with the exception of 1878, when it was 63°·6, the highest for 25 years; TSS on the 4th and 26th, and distant T on the 14th and 15th, which were very hot days. Solar halo on the 12th, and fog on the 16th. Rainfall for the six months ending July 1st 6·91 in., or only 55 per cent. of the average; with the exception of 1892, the smallest fall for the first six months of the year since 1875.

TORQUAY, CARY GREEN.—R ·31 in. below the averege. Mean temp. 61°·3, or 2°·5 above the average. Duration of sunshine 265 hours 45 minutes, being 33 hours 10 minutes above the average; no sunless day.

POLAPIT TAMAR [LAUNCESTON].—The month began with much needed R and cloudy weather, but the middle and end were very hot and dry, with the wind blowing steadily from N. and N.W. A bright and dry month with very little T or heavy rain. The grass min. fell to 39°·0 on 22nd.

STROUD, UPFIELD.—Heavy storm, with T from 1.30 to 2.30 p.m., and with T and vivid L from 3.30 to 4.30 p.m. on 5th A man killed under a tree, two miles from here.

WOOLSTASTON.—A very hot month. The long drought broke up on the 2nd, but too late to save the hay crop, which is very scanty. T and L on 3rd. Mean temp. 61°·2.

TENBURY, ORLETON.—A very warm, dry month; the warmest June recorded here in 35 years, the mean temp. being more than 4°·5 above the average, and 0°·8 above that of June, 1868. The R of the first six months of the year is 7·21 in., or just one-half of the usual quantity, and less than in any other year since the record was started. T on the 3rd and 25th.

LEICESTER, BARKBY.—T and L on 6th and 7th, T on 2nd, 3rd, 4th, 15th, 16th, 17th, 24th and 30th.

HULL, PEARSON PARK.—TSS on 2nd, 4th, 6th, 8th and 20th. H on 6th.

SEATHWAITE.—Very hot on the 4th, with T and L and heavy R at 4 p.m. T and L from 10 a.m. to 5 p.m. on 6th.

WALES.

HAVERFORDWEST.—Although R was measured on 13 days, still the month must be reckoned as another of disastrous drought. The falls of R were so small (except on the 4th and 15th) and the sunshine and high temp. so much

above the average for June, that they completely neutralized the rainfall. The total fall from the 1st January up to the end of this month, has only amounted to 9 40 in., beating the record of all former years since 1849. This is certainly one of the most unfortunate seasons on record in this county. The month ended with boisterous winds and lower temperature.

ABERYSTWITH, GOGERDDAN.—Bright sunshine throughout the month; wind mostly from S. and S.W.

SCOTLAND.

CARGEN [DUMFRIES].—The mean temp. of the month is 2°·7 above the average, and has only twice during the last 37 years been slightly exceeded, viz., in 1865 and 1893. This high mean temp. has been reached notwithstanding a spell of cool east winds during the first ten days of the month. The rainfall is unusually heavy for June, but the total for the first six months of the year is more than 3·50 in. below the average. T and L on 1st, 8th and 11th. With the exception of a W. breeze, very strong for this season, on 30th, and a fairly stiff blow from N.W. on 21st, winds have been unusually light. Crops generally look well, and are in a very advanced state.

JEDBURGH.—The temp. of the month has been much higher than in the June of 1895, and vegetation has progressed greatly. Flowers are fully a fortnight earlier this year. Tree and bush fruits are good crops, and grain crops look well, but there is now a want of rain, and pastures are getting bare in consequence.

COLMONELL.—Rainfall 1·60 in. above the average of 20 years. Mean temp. 60°·1, or 3°·4 above the average.

BRAEMAR.—A most excellent month; luxuriant growth, and roses in full bloom one month earlier than usual in this district.

ABERDEEN, CRANFORD.—Cold and wet with very little sunshine. Heavy thunder-shower on 19th, ·25 in. falling in 7 minutes.

S. RONALDSAY, ROEBERRY.—A wet month. Mean temp. 52°·4, slightly above the average.

IRELAND.

DARRYNANE ABBEY.—A very warm month.

O'BRIENSBRIDGE, ROSS.—June proved an average good month, with a lower temp. than May. The last day of the month was the coldest since March, with strong S.W. wind.

DUBLIN.—A very favourable, warm, summer-like month. It is true that the R and rainy days equalled, or slightly exceeded, the average but 78 per cent. of the total precipitation occurred on 3 days, leaving only 22 per cent. to be distributed over the remaining 11 rainy days. The month, therefore, was showery rather than wet. The heat on the 15th was very unusual for June in Ireland. The amount of cloud was large for so fine a month, and the strength and persistency of the N.W. winds of the closing period are noteworthy. Mean temp. 61°·4, or 3°·6 above the average. High winds on 7 days, but the force of a gale was attained only on the 30th. Temp. reached or exceeded 70° in the screen on 9 days. TS and H on the 24th, and T on the 18th.

OMAGH, EDENFEL.—On the whole a very favourable month. The rainfall of the first week, followed by a brilliant spell of hot weather till the 15th, stimulated into further luxuriance the already fine promise of all vegetation; the rainy and broken weather of the latter half of the month, however, greatly added to the difficulty of saving the heaviest hay crop known for years.

SYMONS'S

MONTHLY

METEOROLOGICAL MAGAZINE.

CCCLXVII.] AUGUST, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

THE THAMES RUN DRY.

WHEN we look from London Bridge at the Thames, even at the very lowest tide, it is extremely hard to believe that less than two hundred years have passed since men walked across its bed, not indeed dry shod, but without serious inconvenience. We are not prepared to defend all that old chroniclers say, but on the other hand we are not inclined to regard all the following narratives as fictitious. Why should we?

The old London Bridges were almost like weirs, so greatly did they obstruct the flow of the river; but making full allowance both for that, and for slightly figurative language, the statements are very marvellous.

For suggesting the subject and for collecting some of the information, we are indebted to Mr. Henry Sharp, of Hampstead. We have added to it as much as time permitted, and if any of our readers can supplement or contradict it, we shall be obliged by their so doing, as of course our only desire is to ascertain facts.

A.D. 1114.—"This year there was so great an ebb everywhere in one day as no man remembered before, so that men went through the Thames, both riding and walking, east of [*i.e.* below] London Bridge.—*Anglo Saxon Chronicle*, Bohn's Edition, 1847, p. 484.

A.D. 1114.—April 4th. River Thames in London so dry that children waded over between the bridges, and the town. Under London Bridge only knee deep; was dry for two days.—*Stow.*

A.D. 1114.—October 10th. The Thames on that day suffered a great want of water; for between the bridge [*i.e.* London Bridge] and the royal Tower, and even under the bridge, the water of the river was so diminished, that not only horses, but also an innumerable crowd of men and boys walked through it, the water hardly reaching their knees. This shortness of water lasted from the middle of the preceding night till the full darkness of the following night.—*Florence of Worcester.*

A.D. 1114.—Such a defect of water in the Thames that great numbers of people crossed not only above and below London Bridge, but likewise through several of its arches, upon the ground, with dry feet.—*Maitland's History of London.*

A.D. 1158.—An earthquake happened in many places through England, and the River of Thames was dryed uppe, that at London men might walke over the same dryshod.—*Stow's Annals*, 1615.

A.D. 1281.—So great a drought that men passed over the river Thames dryshod between Westminster and Lambeth, and over the Medway between Strood and Rochester.—*Stow.*

A.D. 1541.—A remarkable drought; almost all the small rivers dried up, and the river Trent diminished to a straggling brook. The river Thames so low that the sea water even at ebb, extended beyond London Bridge.—*E. J. Lowe's Natural Phenomena & Chronology of the Seasons*, 1870, p. 18.

A.D. 1591.—The Thames, historians say, was so dryed up, that a man might ride over it on horseback near London Bridge, —*Thoresby.*

A.D. 1592.—September 5th. One standing on the shore of the Thames could not see any water in it from London Bridge to Westminster.—*Stow* [See quotation in full under date of 1716, Sept. 14th.]

A.D. 1687.—May 12. This day there was such a storm of wind as had seldom happened, being a sort of hurricane. It kept the flood out of the Thames so that people went on foot over several places above bridge.—*Evelyn* in *Baker's Seasons.*

A.D. 1716.—September 14th. This being the last occasion, we have taken some pains to collect corroborative evidence as well as direct statements, and have quoted repetitions where any fresh fact is mentioned.

A.D. 1716.—DEAL.—September 14th. "Last night we had a violent storm at S.W., which drove several ships from their anchors."—*The Post Man*, No. 11520, September 15th to 18th, 1716.

DOVER.—September 14th. "Last night, in a dreadful storm, a Dutch ship was cast away."—*Idem.*

HARWICH.—"On Thursday night, September 13th, two laden ships from Newcastle were lost."—*Idem.*

YARMOUTH.—"Last night we had a violent storm, which drove from their anchors several vessels."—*Idem.*

LONDON.—"So violently tempestuous was this storm, that it obstructed the coming up of the tide in the River of Thames, which was even driven to so low an ebb, that both above and below the Bridge, people passed and repassed on the sands, which lay so clearly bare to view, that a silver tankard, a silver-hilted sword, a gold ring, a

guinea, and several other things, were taken up, that had been lost there."—*The Weekly Packet*, No. 220, September 15th to September 22nd, 1716.

A.D. 1716.—September 14th. And in speaking of this, it ought to be taken notice that this river has several times been blown almost dry, so that one on the shore could not see any water in it from London Bridge to Westminster, particularly on the 5th of September, 1592, and again on the 14th of September, 1716; of the last I was an eye witness. The springs being then low, a strong Westerly wind that had blown all that day and the preceding night, prevented the tide coming in twenty-four hours, and drove forward the fresh water with that fury that there was only a narrow channel in the middle scarce ten yards wide, and so shallow that thousands of people passed over it on foot.—*Survey of London and Westminster*, by J. Stow, edited by J. Strype, 1754, Vol. 1, p. 58.

A.D. 1716.—[Date not given, context shows that it refers to 1716, 1717 or 1718, and therefore it doubtless was September 14th, 1716, *i.e.*, the same as the preceding.] By a long and dry season, the fresh stream of the river Thames was reduced so low, that by the intervention of a violent storm of wind at West South West, it was blown so dry, that many thousands of people passed it on foot, both above and below London Bridge, and through most of the arches.—*History of London, by W. Maitland, F.R.S.*, 1775, p. 521.

A.D. 1716.—September 14th. The Thames lay perfectly dry both above and below bridge, leaving only a very narrow channel; which extraordinary circumstance was occasioned by a strong westerly wind, that blew all the preceding day and night, which forced back the tide, and drove forward the ebbing waters.—*Boyle's Universal Chronology*, 1826, vol. ii., p. 748.

A.D. 1716.—"In the year 1716 a very remarkable phenomenon occurred at London Bridge, when in consequence of the long drought, the stream of the River Thames was reduced so low, and from the effect of a violent gale of wind at W.S.W. was blown so dry, that many thousands of people passed it on foot, both above and below the bridge, and through most of the arches. Strype, in his edition of Stow's *Survey*, Vol. 1, p. 58, states that he was an eye-witness to this event, and observes that, on September 14th, the channel in the middle of the river was scarcely ten yards wide, and very shallow, the violence of the wind having prevented the tide from coming up for the space of four and twenty hours. Whilst the Thames remained in this state, many interesting observations were made on the construction and foundation of London Bridge."—*Chronicles of London Bridge*, p. 482-3, by an Antiquary, London, 1827.

THE FIRST USE OF KITES IN METEOROLOGY.

To the Editor of the Meteorological Magazine.

SIR,—In your review of the scientific use of kites at the Blue Hill Observatory (*Met. Mag.*, February, 1895, p. 10), you say:—"We believe that the first use of a kite in connection with meteorology was about 1750, when Franklin, in his well-known experiment, obtained electrical discharges from a thunder-cloud by means of a cord carried up to the cloud by a kite."

As the successful exploration of the lower mile of air by self-recording instruments, elevated by kites, at this Observatory is attracting world-wide attention, it seems but fair to state that kites were not first used for this purpose in 1752 by my illustrious countryman, Dr. Franklin, but, as far as I know, the credit belongs to a Scotchman, Dr. Alexander Wilson, Professor of Practical Astronomy at Glasgow, who in 1749, with a student, Thomas Melville, explored the temperature of the atmosphere in the higher regions by raising a number of paper kites one above another upon the same line, with thermometers appended to those that were to be most elevated. I quote an account of the experiment tried at Camlachie in July, 1749, from the biography of Alexander Wilson, M.D., contained in *Trans. Roy. Soc. Edin.*, Vol. x., Part II. :—

"Six paper kites, 4 to 7 feet in height, were made upon the strongest and lightest construction the materials would admit of. A quantity of line was spun of different sizes and strength. . . . The smallest kite, being exactly balanced, soon mounted steadily to its utmost limit, carrying up a line very slender, but of a strength sufficient to command it. In the meantime the second was made ready. Two assistants supported it between them in a sloping direction, with its breast to the wind, and with its tail laid out evenly on the ground behind, whilst a third person, holding part of its line tight in his hand, stood at a good distance directly in front. Things being so ordered, the extremity of the line belonging to the kite already in the air was hooked to the back of the second, which being now let go, mounted very superbly, and in a little time also took up as much line as could be supported to advantage, thereby allowing its companion to soar to an elevation proportionately higher. Upon launching these kites according to the method which had been projected, and affording them abundance of proper line, the uppermost one ascended to an amazing height, disappearing at times among the white summer clouds, whilst all the rest in a series, formed with it in the air below such a lofty scale, and that, too, affected by such regular and conspiring motions as at once changed a boyish pastime into a spectacle which interested every beholder. The pressure of the breeze upon so many surfaces communicating with one another, was found too powerful for a single person to withstand when contending with the undermost strong line, and it became necessary, therefore, to keep the mastery over the kites by other means.

"This species of aërial machinery answering so well, Messrs. Melville and Wilson employed it several times during that and the following summer in pursuing those atmospherical experiments for which the kites had been originally intended. To obtain the information they wanted, they contrived that thermometers properly secured, and having bushy tassels of paper tied to them, should be let fall at stated periods from some of the higher kites, which was accomplished by the gradual singeing of a match-line. When engaged in these experiments, though now and then they communicated immediately with the clouds, yet as this happened always in fine dry weather, no symptoms whatever of an electrical nature came under their observation. The sublime analysis of the thunderbolt and of the electricity of the atmosphere, lay yet entirely undiscovered, and was reserved two years longer for the sagacity of the celebrated Dr. Franklin."

A. LAWRENCE ROTCH, F.R.Met.Soc.,
Director Blue Hill Met. Observatory.

Readville, Mass., U.S.A., July 4, 1896.

REVIEWS.

Neudrucke von schriften und Karten * * * *herausg.* von Prof. Dr. HELLMANN. No. 5. Die Bauern-Praktik, 1508. Berlin: A. Asher and Co., 1896. 4to, 83 pages.

IT is unnecessary for us to say anything as to the excellence of this series of reprints. If in times to come meteorologists take any interest in the early history of their science, there will be no one to whom they will be so much indebted as to Dr. Hellmann. Who wrote this manual of weather proverbs is not known, but we believe that Dr. Hellmann is right in describing it as having the largest circulation of any meteorological book; sixty editions of it appeared in Germany, and it was translated and reprinted in France, England, Denmark, Norway, Sweden, Bohemia, Finland, &c. MS. copies have been traced back to the 10th century.

We are not going over the ground covered by Dr. Hellmann, but he has pointed out the difficulty of tracing in Germany the history of English editions of a popular book of this kind. He has done wonderfully well, but the hunt had a charm for us, and so, instead of reviewing Dr. Hellmann's book, we have done what we could towards giving a list of English editions. We are aware of many imperfections in it, but work of this class can be done by us only as a rest from matters of more practical importance, and our list must be accepted *quant. val.* Moreover, popular books like this, printed on poor paper, seldom provided with any better binding than a thick paper cover, were rarely preserved. As an illustration of the numbers which have perished, we may point out that the edition of

1806 ? is stated on the second title page to be the 12th edition, and we cannot trace a single copy of any one of the previous eleven.

As might have been expected, both from the date, and from the class of printers by whom the books were issued, the printing and the spelling are very bad We have endeavoured to reproduce the titles verbatim, and have not specially marked the misprints; they are obvious.

THE BOOK OF KNOWLEDGE—THE HUSBANDMAN'S PRACTICE—THE SHEPHERD'S PROGNOSTICATION.

Before giving the list of editions, it may be well to explain that in its complete form the book consists of three parts, as above.

The first is attributed to Godfridus, an astronomer, of whom we can find no trace.*

The second is said to be based upon the works of Albert (*i.e.*, Albertus Magnus, 1193–1280), Alkind (*i.e.*, Alkindus, author of a treatise on rain, 1100 ?), Haly (*i.e.*, Albuassin or Alboazen Haly, an Arab Astrologer, 1255 ?), and Ptolomy (*i.e.*, Ptolemy the Astronomer, 120–161).

The third book is attributed to "Melampus, a Greek Author," of whom the only traces we have found are that Houzeau and Lancaster, in their *Bibliographie d'Astronomie* report, a MS. by Melampus = Melampous, entitled, "Methodus praedictionum lunarium," as existing in the Imperial Library at Vienna, and that Watt says that there was a Melampus or Melampodius, a physician, B.C. 270, but we are not aware of his having left any work on the weather, and certainly he in B.C. 270 could not have utilized the labours of Albertus Magnus and others who were not born until hundreds of years after he was buried.

1530 ? GODFRIDUS. Here begynneth THE BOKE OF KNOWLEDGE OF THYNGES VNKNOWEN APPERTEYNYNGE TO ASTRONOMYE, with certayne necessarye Rules, and certayne Sp[h]eres conteynyng herein. * * *

Compyled by GODFRIDUS *super Palladum de Agricultura Anglicatum.*

16mo—woodcut on back of title.

Impr. by me, Robert Wyer, dwellynge at the Sygne of S. John Euangelyst in S. Martyns Paryshe besyde Charynge Crosse.

British Museum Library.

(Lowndes reports two editions, one with cuts, the other without, but he gives no dates.)

* We think it just possible that the name Godfridus was placed upon the title page to give importance to the book. We see no reference to Godfridus in the lists for other countries, and have a suspicion that Godfridus was one Thomas Godfrey, a London printer, whose books are mostly without date, but a few are dated 1522 and 1532.

[?] THE BOKE OF KNOWLEDGE OF THYNGES VNKNOWN, APPERTEYNING TO ASTRONOMYE, with certaine necessarye Rules. 16mo. London, Hugh Jackson.
Watt.

[?] THE HUSBANDMAN'S PRACTISE; or, PROGNOSTICATIONS FOR EVER, as teacheth Alberte, Alkin, Haly and Ptholome. 16mo. London, Hugh Jackson.
Watt.

1585. THE KNOWLEDGE OF THINGES VNKNOWNE, APPERTEYNING TO ASTRONOMY, wyth necessary Rules and certayne Sp[h]eares contayned in the same. Compyled by Godfridus *super palladium de agricultura Anglicatum.*

Imprinted at London, in Fleetestreete, beneath the Conduite, at the Signe of S. John Euangelist, by H. Jackson, 1585. 8vo.
British Museum Library.

1588. THE BOKE OF KNOWLEDGE. 8vo. London, Hugh Jackson.
Watt.

1642. **The Husbandman's Practice.**
Printed at London by A. N. for Iohn Stafford and are to be sold at his house in Black Horse [Alley in Fleet St.] Sm. 8vo.
Hazlitt.

1649. **The Knowledge of Things Unknown, with the Shepherd's Perpetual Prognostication.**
London: Printed by T. B. for John Stafford. 8vo.
Hazlitt.

1660. **The Husbandman's Practice.**
Printed for John Stafford and are to be sold at the sign of the George at Fleet Bridge. 8vo.
Hazlitt.

1663. **The Knowledge of things Unknowne. shewing the Effects of the Planets and Astronomical Constellations,** with the strange events that befall Men borne under them, *front., woodcut on title, and several others.* **Black Letter.** 8°.

"Compiled by GODFRIDUS *super palladium de Agricultura, Anglicarum*:" this edition includes also the popular books—"The Husbandman's Practice, or Prognostication for ever," "The Shepheard's Prognostication and Wheel of Fortune."
Symons's Catalogue.

1664. THE HUSBANDMAN'S PRACTICE. 12mo.
Hazlitt.

1668. Title page missing, but [**The Knowledge of Things, &c.**] 8vo. Printed by G. P. for George Sawbridge, on Clearkenwell Green.
Hellmann's Library.

1671. **Godfridus. The knowledge of things Unknown, with the husbandman's practice or prognostication for ever.**
12mo. Printed by G. P. for G. Sawbridge, on Ludgate Hill neer Fleet-bridge.
Symons's Catalogue.

1673. **The knowledge of things Unknowne,** &c., as in 1663. Two plates, 8vo.
Printed by W. T.[hackeray], and are to be sold by J. Hose over against Stapels Inn in Holborn.
British Museum Library.

1676. THE KNOWLEDGE OF THINGS UNKNOWN, shewing the Effects of the Planets, &c.
12mo. Printed for W. G. and are to be sold by J. Hose, over against Stapels Inn, in Holborn.
British Museum Library.

1679. THE KNOWLEDGE OF THINGS UNKNOWN, &C.
Lowndes.

1685. **The knowledge of things unknown.**
12mo. Printed for W. Thackeray at the Angel in Duck Lane.
Symons's Catalogue.

1688. **The knowledge of things unknown.**
8vo. Printed by J. M. for W. Thackeray at the Angel in Duck Lane.
British Museum Library.

1693. The Knowledge of things unknown . . . . with the Husbandman's practice.
8vo. Printed by W. D. for W. Thackeray at the Angel in Duck Lane.
Hazlitt.

1697. *The Knowledge of Things Unknown* : // Shewing the Effects of the *PLANETS* // and other Astronomical Constellations. // With the strange Events that befal Men, // Women, and Children, born under them. //

Compiled by Godfridus, *super palladium de Agricultura Anglicorum.*

Together with * the Husbandman's Practice: or, // Prognostications for ever, as teacheth *Albert*, // *Alkind*, and *Ptolomy*. // With the Shepherd's Prognostication for the Wea- // ther, * and *Pythagoras* his Wheel of Fortune. //

This is unknown to many Men,
Though it be known to some Men.

Printed by *W. W.* for **W. Thackeray.**
No date, but from p. 136 it was [1697].

Collation 8vo, Black Letter, pp. 1-76, then a second title as between the two * above, but adding "By *Melampus*, a Greek author," and at foot, "Printed by W. WILDE for H. RHODES in Fleet-street." This forms p. 77, and the book goes on to 172, after which follow 10 pp., unnumbered, giving dates of Fairs.

Symons's Library.

1707. *The Knowledge of Things Unknown.* Printed by H. RHODES at the *Star*, the corner of *Bride Lane*, in Fleet-street, 1707. Collation as above, but with a frontispiece of a man taking angular measurements of the stars (possibly missing from the 1697 copy).

Symons's Library.

1729. THE KNOWLEDGE OF THINGS UNKNOWN, shewing the Effects of the Planets and other Astronomical Constellations, with the Strange Events that befall Men, Women, and Children, born under them, together with the Husbandman's Practice and the Shepherd's Prognostication for the Weather, and Pythagoras, his Wheel of Fortune, *curious cuts*, 12mo. Printed for the booksellers of London and Westminster.

University of London Library.

1743. THE KNOWLEDGE OF THINGS UNKNOWN * * * * with the Husbandman's Practice.

London, Printed for J. Clarke, at the Golden Ball, in Duck Lane, and A. Wilde in Aldersgate Street.

British Museum Library.

1750. THE BOOK OF KNOWLEDGE; Treating of the Wisdom of the Ancients. 8vo. London.

Hellmann's Library.

1800? THE BOOK OF KNOWLEDGE. 12mo, Edinburgh.
This does not mention Godfridus, and contains only selections from the early editions.

British Museum Library.

[1806?] THE COMPLETE // BOOK OF KNOWLEDGE // (Treating of the Wisdom of the ANCIENTS): // shewing // the Effects of the PLANETS and other // Astronomical Constellations: * * * Likewise // a brief account of the natural causes of METEORS, // as Rain, Hail, Snow, Frost, Dew, &c. // * * *

London. Printed and sold by J. Hollis, No. 21, Shoemaker-row, Black-Friars. No date.

Collation—8 vo. Frontispiece (a man looking through a very primitive telescope on an altazimuth stand) pp. 1 to 68, then ½-title, "The Husbandman's Practice; or, Prognostications for Ever," which occupies pp. 69 to 96. (It is very much abridged from the earlier editions). p. 96 finishes with "THE END," and the imprint of the abovenamed, J. Hollis.

In the same volume, by the same printer, and apparently of about the same date, is

THE SHEPHERD'S KALENDAR; or THE CITIZEN'S AND COUNTRYMAN'S COMPANION, containing . . . . Infallible signs of the weather, to know when wet or dry, when sudden storms arise, or hot or cold weather, by living creatures . . . . Being about Forty Years study and experience of a learned Shepherd. 12th Edition, with Additions.

8vo. London, J. Hollis, 21, Shoemaker's Row, Black-Friars.

Collation.—Frontispiece (a shepherd under a tree), pp. i. vi., 7-94. Pages 1-42 are almost wholly filled with weather proverbs, but are mostly different from those in the "Book of Knowledge," and they differ entirely from those in Claridge's "Shepherd of Banbury's Rules to judge of the Changes of the Weather."

Roy. Meteor. Soc. Library.

Three Essays on Australian Weather. HON. RALPH ABERCROMBY. F. W. White, Sydney, 1896. 8vo, iv.–101 pages, 4 plates.

ALTHOUGH not one of these three essays was written by Mr. Abercromby, his head and his purse have been largely instrumental in the production of the present handy volume.

The first is a reprint of Mr. H. C. Russell's paper on "Moving Anticyclones," read before the Roy. Meteor. Soc., and published in the *Quar. Jour.* in 1893.

The second is Mr. Hunt's "Essay on Southerly Bursters," which obtained the £25 prize offered by Mr. Abercromby, and which was mentioned on page 47 of our last volume.

The third essay is new; it has been prepared by Mr. Hunt at Mr. Abercromby's expense, and has been edited by Mr. H. C. Russell, the title being, "Types of Australian Weather." It may be briefly described as "40 weather maps of Australia, with commentaries thereupon." We have very little doubt that eventually that which we believe was at one time done in New Zealand will be done generally, viz., that instead of central offices telegraphing the actual readings at individual stations, they will send a code number

corresponding to the type of pressure-system prevailing over their area. This series would form a good basis whereupon to develop such a system. The maps would have gained in clearness had the isobar for 30 inches always been made twice the thickness of any other. As it is, there are a few instances in which it is not easy to be sure what values some isobars represent—*e.g.*, the S.E. of No. 17 and the S.W. of No. 25.

There is one point upon which the author is silent, probably because he was writing as an Australian for Australians, and they doubtless realize the vastness of their country, and the immense areas whence they have no records, but for general readers it would have been well to give one map showing the stations whence alone data were available. If, as we presume, the arrows represent the stations, there seems to be an area (W. of Sir Charles Todd's line of telegraph stations) about twice the size of the British Isles, whence no returns are received; this gives a grand opportunity for drawing symmetrical isobars—and we see that they are drawn with equal confidence over the sea between Australia and New Zealand, a stretch of about 1,000 miles—say equal to the distance from Cornwall to Gibraltar; this again is a lovely field for the development of the imagination. We neither think nor suggest that Mr. Hunt's curves are improbable, but we should have had more confidence in them had the curves been solid where ample data existed, and dotted where they represent merely probabilities.

ERRATA IN "METEOROLOGICAL MAGAZINE," 1895.

Regular Tables.

Camden Square	Jan.	Min. temp. 20°·2 on 30th *should be* 17°·2 on 29th.
Cardiff, Ely	,,	Total rain *should be* 4·84 in., *not* 4·74 in.
,, ,, ...	June	,, ,, ,, ,, 1·24 ,, ,, 1·63 ,,
Glencarron Lodge	Oct.	,, ,, ,, ,,11·16 ,, ,,11·20 ,,
Darrynane Abbey	Sep.	,, ,. ,, ,, ·99 ,, ,, ·88 ,,

Supplementary Tables.

Dorking, Abinger Hall..	Jan.	Total rain *should be* 2·51 in., *not* 2·45 in.
Longford, Curry grane ..	Feb.	,, ,, ,, ,, ·36 ,, ,, 2·07 ,,
Lynmouth, Glenthorne.	Mar.	,, ,, ,, ,, 3·94 ,, ,, 4·07 ,,
Clifton, Pembroke Road	,,	,, ,, ,, ,, 2·41 ,, ,, 2·27 ,,
Killarney, Woodlawn...	Oct.	,, ,, ,, ,, 4·63 ,, ,, 4·00 ,,

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, FEBRUARY, 1896.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	56·4	28	23·2	26	46·2	34·7	36·6	88	86·9	19·8	·30	8	7·0
Malta	63·8	15*a*	40·1	18	60·2	51·3	46·8	84	119·1	33·2	1·91	9	6·3
Mauritius	85·6	8	69·6	25	82·3	73·8	70·8	81	135·8	62·4	30·06	22	7·1
Calcutta	98·5	27	52·4	21	86·3	61·6	54·3	54	149·7	44·0	·02	1	1·3
Bombay	85·5	29	65·4	21	82·4	69·0	65·5	70	133·5	52·4	·00	0	1·2
Ceylon, Colombo	93·4	27	67·5	2	89·8	72·4	68·5	71	160·5	60·0	·35	2	3·3
Melbourne	102·8	17	49·2	2	75·0	58·6	56·0	71	149·9	40·0	3·08	8	6·3
Adelaide	110·9	17	53·4	1, 3	86·2	63·7	52·3	45	160·8	42·7	·32	5	3·8
Sydney	98·0	1	58·7	4	76·9	66·8	65·0	77	156·4	51·3	4·74	18	6·9
Wellington	79·0	22	45·0	12*b*	69·6	54·9	50·1	65	139·0	36·0	3·34	6	3·7
Auckland	84·0	8	48·5	25	75·1	58·3	54·4	65	146·0	45·0	·34	6	4·0
Jamaica, Kingston	91·1	12	65·8	1	85·6	69·4	66·4	76	...	...	2·40	5	3·2
Trinidad	89·0	5dys	63·0	26	86·9	66·7	67·5	77	167·0	61·0	·88	7	...
Grenada	85·0	24	69 0	11	81·7	71·4	66·2	70	151·2	...	3·45	15	2·0
Toronto	44·9	28	−17·2	17	29·7	14·6	20·6	83	73·0	−23·5	3·95	...	6·8
New Brunswick, Fredericton	44·4	24	−20·0	18	25·8	7·3	13·3	76	...	...	4·78	14	5·8
Manitoba, Winnipeg	45·8	26	−42·4	15	18·5	−7·5	...	...	...	...	·42	5	3·9
British Columbia, Esquimalt	55·1	18	26·2	29	50·4	37·4	38·7	89	...	...	6·80	21	7·8

a—and 27. *b*—and 24.

REMARKS.

MALTA.—Adopted mean temp. 54°·1, or 0°·2 above the average. Mean hourly velocity of wind 9·5 miles. Thunderstorm on 24th; hail on 16th and 17th. Dew-point temp. ranged between 35°·3 on 17th and 56·9 on 24th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·7 below, of dew point 0°·8 above, and rainfall 22·91 in. above, their respective averages. Mean hourly velocity of wind 13·0 miles, or 1·7 mile above average; extremes, 51·3 on 19th, and 1·8 on 3rd; prevailing direction, E.S.E. Lightning on 2nd and 3rd, and thunder on 7th. This month has been the wettest on record all over the Island, and especially on the uplands, from 40 to 55 inches falling at several stations; from 9 a.m. on 19th to 10.25 a.m. on 20th 17·34 in. of rain fell at the Observatory. C. MELDRUM, F.R.S.

Adelaide.—Mean temp. 1°·3 above the average of 39 years; rainfall ·28 in. below the average. The absolute max. in shade is the highest ever recorded here in February. C. TODD, F.R.S.

Sydney.—Mean temp. 1°·0 above, humidity 2·9 above, and rainfall ·76 in. below, their respective averages. H. C RUSSELL, F.R.S.

Wellington.—Very heavy rain (2·10 in.) on 2nd, with a strong N.W. gale, then generally fine up to the 22nd; remainder of the month showery, especially on 23rd, when 1·00 in. of rain fell. Strong N.W. winds during the latter part, otherwise a fine, bright, warm month. Mean temp. 0°·2 below, and rainfall ·20 in. below the average. R. B. GORE.

Auckland.—An exceedingly dry and fine month, the rainfall being less than one-tenth of the average. Barometrical pressure and mean temp. both above the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—In Kingston, weather fair; mean hourly velocity of wind 4·6 miles; rainfall about four times the average. In the Island generally, however, the fall was twice the average. R. JOHNSTONE.

TRINIDAD.—Rainfall ·81 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, JULY, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	1·39	XI.	Lake Vyrnwy	2·35
,,	Birchington, Thor	1·39	,,	Corwen, Rhug	1·60
,,	Hailsham	1·65	,,	Llanystumdwy, Talarvor	3·45
,,	Ryde, Thornbrough	1·03	,,	I. of Man, Douglas	5·93
,,	Emsworth, Redlands ...	1·15	XII.	Stoneykirk, Ardwell Ho.	6·51
,,	Alton, Ashdell	·92	,,	New Galloway, Glenlee	7·01
III.	Oxford, Magdalen Col..	1·39	,,	Lilliesleaf, Riddell	3·68
,,	Banbury, Bloxham	1·21	XIII.	N. Esk Res. [Penicuick]	4·05
,,	Northampton, Sedgebrook	1·23	,,	Edinburgh, Blacket Pl..	4·33
,,	Alconbury	1·08	XIV.	Glasgow, Queen's Park..	3·92
,,	Wisbech, Bank House...	1·58	XV.	Inverary, Newtown	4·05
IV.	Southend	1·12	,,	Oban, The Corran	...
,,	Harlow, Sheering..... ...	·83	,,	Islay, Gruinart Schools..	3·91
,,	Colchester, Lexden	·57	XVI.	Dollar.....	4·20
,,	Rendlesham Hall	·35	,,	Balquhidder, Stronvar...	4·62
,,	Rushall Vicarage	1·00	,,	Ballinluig	2·79
,,	Swaffham	2·07	,,	Dalnaspidal H.R.S.....	3·96
V.	Salisbury, Alderbury ...	·69	XVII.	Keith H.R.S.....	3·03
,,	Bishop's Cannings	1·71	,,	Forres H.R.S.	3·06
,,	Blandford, Whatcombe .	·86	XVIII.	Fearn, Lower Pitkerrie..	3·58
,,	Ashburton, Holne Vic...	2·29	,,	N. Uist, Loch Maddy ...	4·61
,,	Okehampton, Oaklands.	1·81	,,	Invergarry.....	2·24
,,	Hartland Abbey	1·61	,,	Aviemore H.R.S.	3·09
,,	Lynmouth, Glenthorne.	1·11	,,	Loch Ness, Drumnadrochit	2·09
,,	Probus, Lamellyn	2·13	XIX.	Invershin	2·06
,,	Wellington, The Avenue	1·33	,,	Scourie	3·15
,,	Wincanton, Stowell Rec.	1·21	,,	Watten H.R.S.....	3·34
VI.	Clifton, Pembroke Road	·97	XX.	Dunmanway, Coolkelure	6·83
,,	Ross, The Graig	1·08	,,	Cork, Wellesley Terrace	5·16
,,	Wem, Clive Vicarage ...	2·34	,,	Killarney, Woodlawn ...	6·05
,,	Cheadle, The Heath Ho.	1·04	,,	Caher, Duneske	4·89
,,	Worcester, Diglis Lock	1·81	,,	Ballingarry, Hazelfort...	5·19
,,	Coventry, Coundon	2·09	,,	Limerick, Kilcornan ...	4·00
VII.	Ketton Hall [Stamford]	1·46	,,	Broadford, Hurdlestown	...
,,	Grantham, Stainby	1·86	,,	Miltown Malbay	5·55
,,	Horncastle, Bucknall ...	1·75	XXI.	Gorey, Courtown House	5·07
,,	Worksop, Hodsck Priory	1·53	,,	Athlone, Twyford	7·48
VIII.	Neston, Hinderton	1·98	,,	Mullingar, Belvedere ...	6·94
,,	Southport, Hesketh Park	3·98	,,	Longford, Currygrane...	7·41
,,	Broughton-in-Furness ...	5·66	XXII.	Woodlawn	7·24
IX.	Ripon, Mickley.....	1·84	,,	Crossmolina, Enniscoe ..	4·52
,,	Melmerby, Baldersby ...	2·17	,,	Collooney, Markree Obs.	4·69
,,	Scarborough, Obs.	2·02	,,	Ballinamore, Lawderdale	...
,,	Middleton, Mickleton ...	2·49	XXIII.	Lough Sheelin, Arley...	7·67
X.	Haltwhistle, Unthank...	3·08	,,	Warrenpoint.....	7·72
,,	Bamburgh	2·60	,,	Seaforde..	6·78
,,	Keswick, The Bank	4·16	,,	Belfast, Springfield	7·74
XI.	Llanfrechfa Grange	1·66	,,	Bushmills, Dundarave..	5·64
,,	Llandovery	1·97	,,	Stewartstown	7·26
,,	Castle Malgwyn	4·33	,,	Killybegs	4·60
,,	Builth, Abergwesyn Vic.	3·29	,,	Lough Swilly, Carrablagh	4·01
,,	Rhayader, Nantgwillt ...	2·64			

JULY, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth.	Greatest Fall in 24 hours. Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·03	— 1·65	·49	26	7	88·7	14	47·7	2, 29	0	0
II.		Maidstone (Hunton Court)...	·73	— 1·45	·40	26	3	...	...	...	...	...	...
,,		Strathfieldsaye	·60	...	·25	26	7	...	...	...	...	...	...
III.		Hitchin	1·01	— 1·71	·56	26	9	85·0	13	44·0	10*f*	0	...
,,		Winslow (Addington)	1·02	— 2·27	·45	26	12	87·0	21	40·0	29	0	0
IV.		Bury St. Edmunds (Westley)	2·07	— ·50	·44	29	11	78·0	14*b*	47·0	18	0	...
,,		Norwich (Brundall)	1·00	...	·23	15	8	85·0	21	41·4	3	0	0
V.		Weymouth(LangtonHerring)	·72	— 1·43	·22	24	10	75·0	10*c*	50·0	29	0	...
,,		Torquay (Cary Green)	1·52	...	·84	24	10	75·4	7	50·0	28*g*	0	0
,,		Polapit Tamar [Launceston]..	1·55	— 1·86	·63	24	13	80·7	20	39·4	28	0	0
VI.		Stroud (Upfield)	·68	— 2·89	·17	1	12	83·0	20	49·0	28	0	...
,,		ChurchStretton(Woolstaston)	2·28	— ·69	·65	9	12	81·5	20	45·0	17	0	...
,,		Tenbury (Orleton)	1·77	— 1·09	·52	31	12	85·3	13	38·9	28	0	0
VII.		Leicester (Barkby)	3·55	+ ·56	2·78	7	14	85·0	20*d*	38·0	27	0	0
,,		Boston	·73	— 2·06	·22	7	7	92·0	13	45·0	28	0	...
,,		Hesley Hall [Tickhill].....	1·61	— 1·06	1·02	26	11	86·0	20	42·0	28	0	...
VIII.		Manchester(PlymouthGrove)	1·90	— 1·89	·50	24	13	85·0	13	41·0	27	0	...
IX.		Wetherby (Ribston Hall) ..	1·90	— 1·28	·42	22	8	...	...	...	...	...	...
,,		Skipton (Arncliffe)	3·97	— 1·67	1·05	24	10	..	...	...	...	...	...
,,		Hull (Pearson Park).	1·18	— 1·41	·57	26	10	85·0	20	43·0	29	0	...
X.		Newcastle (Town Moor)	2·70	— ·82	·95	24	12	...	..	...	...	...	...
,,		Borrowdale (Seathwaite).....	8·97	— 2·02	1·53	8	18	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·64	— 2·42	·45	24	11	...	...	...	...	...	...
,,		Haverfordwest	4·60	+ ·39	1·32	24	15	76·8	20	40·6	28	0	0
,,		Aberystwith (Gogerddan) ...	2·88	...	·55	9	13	76·0	31	36·0	16	0	...
,,		Llandudno.....	2·97	— ·03	·92	9	14	73·0	20	48·5	8	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	5·27	+ 1·34	1·13	23	12	74·2	13	39·0	28	0	0
,,		Jedburgh (Sunnyside).....	3·17	— ·27	·55	8	12	77·0	13	38·0	28	0	...
XIV.		Colmonell	7·09	...	1·67	8	20	79·0	12	40·0	9, 27	0	...
XV.		Lochgilphead (Kilmory).....	4·21	— ·09	·48	19	23	...	...	38·0	27	0	...
,,		Mull (Quinish).....	4·43	+ ·38	·76	25	24	...	...	...	...	...	...
XVI.		Loch Leven Sluices	4·30	+ ·68	1·30	26	10	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	3·75	+ ·29	1·35	25	15	76·8	18	42·2	28	0	...
XVII.		Braemar	3·23	+ ·02	1·06	25	15	74·4	18	35·0	24	0	3
,,		Aberdeen (Cranford)	3·54	...	1·32	25	18	78·0	19*e*	42·0	2, 27	0	..
XVIII		Strathconan [Beauly]	2·55	— ·95	1·25	27	10	...	...	..	...	...	...
,,		Glencarron Lodge.....	4·02	...	·90	25	20	69·0	13	39·6	28	0	...
,,		Cawdor	3·74	+ ·44	·84	25	21	...	...	..	...	..	...
XIX.		Dunrobin	3·31	+ ·46	1·39	24	15	70·0	19	44·0	25*h*	0	...
,,		S. Ronaldsay (Roeberry).....	3·11	+ ·75	1·20	25	14	67·0	11	45·0	1	0	...
XX.	IRELAND.	Darrynane Abbey.....	5·82	...	1·57	23	20	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	7·06	+ 3·53	2·00	9	14	74·0	18	43·0	27	0	...
,,		O'Briensbridge (Ross)	5·50	...	2·23	24	16	..	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	4·76	+ 1·24	1·67	8	16	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	5·47	+ 2·79	2·02	24	18	76·7	13	45·0	28	0	0
XXII.		Ballinasloe	7·62	+ 4·07	2·50	24	19	72·0	20	40·0	10	0	...
,,		Clifden (Kylemore)	8·36	...	2·31	8	20	...	...	...	...	..	...
XXIII		Waringstown	8·10	+ 4·58	1·82	8	20	79·0	11	45·0	4*i*	0	0
,,		Londonderry (Creggan Res.).	5·44	+ 1·32	1·31	25	25	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·63	+ ·91	·90	8	20	70·0	13	37·0	27	0	...

+Shows that the fall was above the average ; —that it was below it.

a—and 14, 20. *b*—and 22. *c*—and 14. *d*—and 21. *e*—and 20. *f*—and 31. *g*—and 29. *h*—and 28. *i*—and five other dates.

METEOROLOGICAL NOTES ON JULY, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

HITCHIN.—This month completes the driest period of seven months from January to July in our record, except 1870.

ADDINGTON.—A hot, dry month, what little rain fell being quickly dried up by the hot ground. On the evening of the 7th, at 6 o'clock, a heavy TS with constant and vivid L but little R occurred to the N. of us. At the end of the month R was much needed, the pastures being dried up and brown. Harvest operations general in the last week of the month.

BURY ST. EDMUNDS, WESTLEY.—A very hot month, with much sunshine, and the storms, as in June, were very partial. The scorching sunshine damaged the barley on light lands. Distant T on 7th, TS on 15th, and T on 26th.

NORWICH, BRUNDALL.—The warmest July since 1887, and the warmest month since August, 1893, the mean temp. being 62°·8. Rainfall 1·89 in. below the average, the deficiency of the year being 3·73 in. The surface of the soil was much scorched and parched by the sunshine and want of rain. The 21st was the warmest day since August 18th, 1893. T and L on 7th; distant TS on 8th.

WEYMOUTH, LANGTON HERRING.—Since the beginning of the year the rainfall has been only 7·63 in., the lowest for the first seven months of the year in 22 years, and only 52 per cent. of the average. Root crops in this neighbourhood are a total failure. The mean 9 a.m. temp., 63°·8, is exactly 1° above the average, and this is the ninth consecutive month with temperature above the average. Fog on the 6th; T and L on the 7th and 14th.

TORQUAY, CARY GREEN.—Rainfall 1·27 in. below the average; the fall of seven months, January to July, being 9·83 in. below the average. Mean temp. 62°·8, or 1°·6 above the average. Duration of sunshine 242 hours 40 mins., being 58 hours 20 mins. above the average; one sunless day.

POLAPIT TAMAR [LAUNCESTON].—Another very dry, hot month, the average max. shade temp. being 69°·5. Fogs early on 5th, 6th, 7th, 12th, 16th, 17th and 19th.

WOOLSTASTON.—Another hot month, and till the 21st very dry, though there was a heavy fall on the 9th. The want of water is severely felt, the brooks being nearly dried up. Harvest began very early, and the grain crops generally are good. Mean temp. 60°·9.

TENBURY, ORLETON.—Another very fine, warm month, with a mean temp. more than 2°·5 above the average. There was a large proportion of hot sun during the first half of the month, but more unsettled weather prevailed towards the end. T on 7th, 17th and 26th.

LEICESTER, BARKBY.—A heavy TS occurred on the 7th, the like of which has not been experienced for many years, 2·78 in. of R falling. This fall did not reach to the Leicester Reservoirs, a few miles hence, so that the water famine continues there in increasing intensity. Mean temp. 61°·8.

MANCHESTER, PLYMOUTH GROVE.—Very fine summer weather prevailed on the 12th and 13th, also on 19th and 20th; but on the whole the weather was dull, cold and unsettled. Mean temp. 57°·5, the lowest for July since observations commenced in 1868. T and L on the 9th.

WALES.

HAVERFORDWEST.—The temp. fell somewhat during the first few days, and small quantities of R fell up to the 9th; very fine harvest weather then prevailed with bright sunshine up to the 15th, when the temp. fell and the wind blew a

moderate gale ; fresh breezes prevailed for a couple of days, followed by fine warm weather again up to the 21st, when a rather sudden fall of temp. took place, with showers. R commenced falling at 5 p.m. on the 23rd, and in about 36 hours 2·80 in. fell, a most acceptable fall, as the country seemed on the verge of ruin. The weather was then fine to the end of the month. No excessive heat prevailed, but the temp. rose above 70° on 14 days. There was a sharp TS at 4 p.m. on the afternoon of the 31st. Prevailing winds N.E. and N.W.

SCOTLAND.

CARGEN [DUMFRIES].—Absence of sunshine (53 hours below the average of the month) and excessive rainfall were the features of the month. Out of a total rainfall of 5·27 in., 3·02 in. fell in the three days 23rd–25th, this heavy fall doing considerable damage to the heavier crops of corn. The mean bar. pressure and mean temp. of the month were about normal. Harvest, which commenced on several farms during the last few days of the month, will be one of the earliest on record in the district, and, generally speaking, crops are above the average. The turnip crop promises well ; pastures continue excellent, and the hay crop was above an average. Potato disease made an unusually early appearance on some farms in the district.

JEDBURGH.—Vegetation made great progress during the month, and all crops look well. The harvest will be a fortnight earlier than usual. Potatoes a good crop, and quite free of disease.

COLMONELL.—Rainfall 3·63 in. above, or rather more than twice, the average of 20 years. Mean temp. 58°·9, or 0°·3 above the average.

ABERDEEN, CRANFORD.—There was little sunshine throughout the month, and a strong gale blew from the north on the 27th.

S. RONALDSAY, ROEBERRY.—A very fair month upon the whole, although wetter than the average of 29 years. Mean temp. 55°·0, 0°·5 above the average.

IRELAND.

DARRYNANE ABBEY.—A wet but warm month.

O'BRIENSBRIDGE, ROSS.—A very favourable month for all purposes, the rather heavy R having fallen in a limited number of days. The heavy fall of 24th (2·23 in.), owing to the dryness of the land and dykes, was quickly absorbed, and did little damage.

DUBLIN.—A generally favourable month, characterised, however, by occasional torrential rainfalls. Rainstorms of exceptional violence occurred on the 8th (1·56 in.) and 24th (2·02 in.) The fall of the 24th is the largest recorded since May 28th, 1892, when 2·06 in. fell. The mean temp., 60°·9, is slightly (0°·3) above average. High winds were noted on only 3 days, and attained the force of a gale only on the 4th. L on the 9th ; TS on the afternoon of the 25th ; solar halo on the 10th.

WARINGSTOWN.—The wettest month recorded since 1861, when the record began ; but in spite of this the crops of all kinds look magnificent, and we only want a moderately fine six weeks to secure a splendid harvest.

OMAGH, EDENFEL.—The frequent and heavy rains which prevailed with but little intermission throughout the month, although of much benefit to grass and green crops, damaged the cereals and imperilled the safety and quality of the hay.

REGISTER MAP INDICATING CONDITIONS OF THE ATMOSPHERE ON THE SAME DAY IN SEVERAL PARTS OF GREAT BRITAIN FROM OBSERVATIONS COLLECTED AT THE GREAT EXHIBITION for 9 a.m. 8th Augt., 1851.

London. Ireland, Saunders & Charing Cross.

SYMONS'S

MONTHLY

METEOROLOGICAL MAGAZINE.

CCCLXVIII.] SEPTEMBER, 1896. [PRICE FOURPENCE, *or 5s. per ann. post free.*

THE FIRST DAILY WEATHER MAP, SOLD IN THE GREAT EXHIBITION OF 1851.

IT is not safe to claim priority for anything, especially while Dr. Hellmann is working in the same direction; but we have not much fear of the above heading being disproved. It will be noticed that we do not say "The First Weather Map," because maps representing atmospheric conditions on special days had been produced many years earlier; they were, however, records of the past, representations of the facts observed months or years before; whereas, by a Daily Weather Map is meant a map published the same day, and containing information transmitted by electric telegraph.

Admiral FitzRoy never published a Daily Weather Map, and his successors, the Meteorological Council, did not give us one until 1872. Le Verrier issued his first on Sept. 16th, 1863; and this, Prof. Harrington in his "History of the Weather Map" *(Chicago Congress)* considered to be the first.

We have the pleasure of presenting our readers with a reduced copy of the first of a series of such maps issued *twelve years earlier.*

We have not yet obtained all possible information respecting it, and, therefore, will now state only, that (1) the accompanying map is rather more than a quarter the size of the original, which is 10·2 in. by 7·2 in. (260 × 183 mm.); (2) that the daily issue continued from August 8th to October 11th, 1851, Sundays excepted; (3) that they were sold daily in the Great Exhibition; and (4) that the Royal Commissioners have kindly lent us the set whence the annexed reproduction has been made.

When we have concluded our enquiries, we hope to lay the results before our readers.

THE BOOK OF KNOWLEDGE.—ISOBARS.—ESCHUID.

To the Editor of the Meteorological Magazine.

SIR,—Your supposition about Godfridus seems to me quite right. Melampus means Black Foot; the name of this old Greek author is placed upon the title page for the same reason as that of Godfridus, viz.: to give importance to the book. Another fictitious author figures on the title page of the edition of 1750 which I possess:

> "Written by *Erra Pater*, a Jew, Doctor in Astronomy and Physick, born in Bethany, near Mount Oliver, in Judea. Made English by W. Lilly, Student in Physick and Astrology." (1)

May I, at the same time, put two questions:—(A) Who was the first to draw (and publish) mean isobars of a country? Is there an earlier map of such isobars than that of France, by E. Renou? (*Annuaire Soc. Mét. de France* 1864). (B) Who first used the word *isobar*? Perhaps Mr. Babington, in FitzRoy's office? (2)

Can anyone tell me anything about the author of the large astro-meteorological work known under the abbreviated title *Summa Anglicana*, printed at Venice in 1489? The author is called *Eschuid*, but this is no English name. The work was written about 1347, by a Fellow of Merton College, Oxford, at the same time as, or a little later than, when another Fellow of the same College (Merle) kept the earliest journal of the weather. In manuscripts of the *Summa Anglicana*, which are numerous, the author's name is spelled

Joannes de Ashenton.
„ „ Ashedene.
„ „ Eschendenis.
„ „ Escheudn.
„ „ Aschelden.
„ „ Esschyngden, &c., &c. (3)

Yours very truly,

G. HELLMANN.

August 19th, 1896.

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(1) We do not quite understand Dr. Hellmann classing Erra Pater's book with Godfridus's, there seems to us so little in common—of Erra Pater there are in the British Museum editions of 1535, 1540? 1600? 1606, 1607? 1630? (two editions), 1700, 1746, 1780, and 1794.

(2) In Admiral FitzRoy's *Weather Book*, 1863, p. 106, he uses the word "isobarometric," whence isobar was a natural contraction.

(3) Dr. Hellmann may well put "&c., &c."; in *Houzeau* we find Aysheden, Aschyden, and Eshuid; *Gesner* gives Estuidius, and the *Crawford Catalogue* gives as the English equivalent, Eastwood. We have no authority for the suggestion, but think that it was probably a member of the old Lancashire family of Assheton.—ED.

Mr. C. Leeson Prince has kindly lent us his copy of

> THE SHEPHERD'S KALENDER; or THE CITIZEN'S AND COUNTRY MAN'S DAILY COMPANION . . . . Infallible signs of the weather, to know when wet or dry, and when sudden storms arise . . . . being about Forty years study and experience of a Learned Shepherd. 5th Ed. London. Printed for C. Hitch at the Red Lyon in Paternoster Row; R. Ware, at the Sun and Bible on Ludgate Hill; and J. Hodges at the Looking-glass on London Bridge. *No date but probably* 1705. 12mo.

This book indicates on how large an enquiry anyone would enter who tried to follow the influence of *The Book of Knowledge*. Pages 15 to 43 (really 51, for the printer has made a mistake and used the numbers 41 to 47 twice) are crammed with weather proverbs, and it is certain that the writer had *The Book of Knowledge* before him, but the quotations are never verbatim, and usually each sentence taken from Godfridus is about half copy and half original. The preface is signed J. S., but we do not know who was the author—he however gives a remarkable collection of weather proverbs, and if Mr. Inwards or anyone else, instead of merely collecting proverbs, tries to trace them back to their origin, this work must not be overlooked. But what with *The Husbandman's Guide*, *The Shepherd of Banbury's Rules*, and *The Shepherd's Kalender*, and the uncertainty as to the date of the first issue of each, the task would not be easy.

We regret having passed an error on p. 104; the edition of 1676 (like most of those dated between 1673 and 1697) was printed for W. Thackeray; the entry W.G. should be W.T.

DRY PERIODS.

Under date of August 1st, Mr. G. J. Symons wrote to *The Times* pointing out that at Camden Square—

(1) The Rainfall of the first seven months of 1896 (8·27 in.) is only 60 per cent. of the average for the 37 years 1859-95.

(2) Out of the 38 years 1859-96, there are only eight in which the fall for the first seven months did not exceed 10 inches, only three of these cases occurring in the first 28 years of the period, while five cases occur in the last 10 years.

(3) The average for the first seven months during the 28 years 1859-86 is 14·24 in., while during the 10 years 1887-96 it is only 11·65 in.

(4) There has been no month since 1880 with a rainfall exceeding five inches, or with a fall of thrice the average.

Commenting on the above, Mr. James M. Fraser, of Lochmaddy, in the Hebrides, writes, "The average rainfall for the first eight

months of the twelve years 1884–95, inclusive, is 27·78 in. This year the total for the first eight months is 34·86 in. Again, though the average for the first eight months, 1884–89, inclusive, is 25·46 in., the average for the first eight months, 1890–95, inclusive, is 30·11 in. These figures show that there is a heavy yearly increase in the rainfall in this district in the first eight months in each year. I mention this with special reference to your communication to the *Times*, about the beginning of August, on the increasing deficiency in the rainfall in the London district in the early months of the past number of years. My figures are from a table which I carefully prepared, and I only regret that my records do not go further back than 1884. It is strange that the London deficiency should be made up here—the opposite extreme of the kingdom."

This is not the first time that attention has been called to a deficiency in one part of the United Kingdom, extending over several years, being, in a sense, compensated by a similar excess in another district.

HEAVY RAINS AT THE BEGINNING OF SEPTEMBER, 1896.

Haslemere, Hazelhurst.—On September 2nd a sharp shower occurred at 2 p.m., and at 4.45 p.m. a sharp TS occurred, and a house in the town was struck by L, the curtains being set on fire. The R ceased at 5.45, and at 6 p.m. there was 1·03 in. in the gauge, most of which fell between 5 and 5.40 p.m. There was continuous R through the night, and the total to 10 a.m. on 3rd was 2·21 in.

T. P. NEWMAN.

Dorking, Fir Tor.—Between 1 p.m. on 1st and about 8 p.m. on 2nd, 3·40 in. of R fell. Of this, 2·75 in. fell in 20 hours between 1 p.m. on 1st and 9 a.m. on 2nd. The nearest approach to this fall was on July 14th to 16th, 1875, when 2·91 in. fell in 48 hours.

F. TAYLOR.

Reigate, Doods.—I found in the rain-gauge for the 24 hours ending 9 a.m., September 2nd, 2·27 in., which is the maximum fall since and including 1882. The R commenced at 11 a.m., slight at first, then a succession of heavy storms (accompanied by loud T and vivid L between 3 and 5 p.m.), continuing until the early morning.

G. E. PYM.

Upper Gatton.—I measured 1·88 in. of R as the fall for 24 hours ending 9 a.m. on 2nd. Most of this fell between 3.45 and 5.30 p.m., at 7.15 p.m., and at 9.30 p.m.; but the R was almost without intermission from noon to midnight.

F. DRUCE.

Sheppey, Leysdown.—Rainfall, September 1st to 7th :—

	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	Total.
	in.	in.	in.	in.	in.	in.	in.	in.
London, *Standard* Office	·32	1·61	—	·23	·48	·08	—	2·72
Leysdown, Kent	·05	·01	—	·29	·01	·08	·03	·47

A. FARBROTHER.

Milford-on-Sea.—On September 8th a fearful TS came on suddenly at 8 p.m., lasting till 11 p.m. L continuous and very brilliant, and very heavy H. R ·75 in. The storm was worst from 10 to 10.30 p.m., with probably more than ·50 in. in the half-hour.

A. F. PARBURY.

Bury St. Edmunds, Westley.—We had a tremendous rain on September 1st (2·10 in.), most of it fell between 5 and 6 in the evening.

R. BURRELL.

Wimborne, Chalbury.—Rainfall here, September 3rd, 1·11 in.; 4th, 1·84 in.; 5th, ·51 in. The 2·95 in. in two successive days is unprecedented.

G. H. BILLINGTON.

WHIRLWINDS.

BRIDGWATER, JUNE 9TH.

ON Tuesday afternoon (June 9th), at about 4.20 p.m., the neighbourhood of Bridgwater was visited by a small cyclone or whirlwind. This somewhat rare phenomenon must not be confounded with the ordinary cyclonic disturbance or "depression" which is the usual cause of the low barometer, rain and gales of the winter months, and which is generally of sufficient size to cover the whole of the British Isles. The true whirlwind or cyclone, of which we have recently received such terrible accounts from America, is of much smaller dimensions, often covering a track only a few yards wide, but where it passes it scatters wholesale destruction to trees and buildings, and when it passes over the sea it carries up the waves with it in the form of a waterspout.

The cause of this phenomenon is doubtless the electric tension existing between the clouds and earth, which, after long periods of dry weather often becomes very great, but usually passes off in the milder form of the thunderstorm. The typical or perfect whirlwind should show a revolving funnel of cloud, the broader end joining the clouds above, while the lower end comes down towards the ground, and, if near enough, it causes a corresponding whirling motion on the surface of the earth, carrying up such things as hay, or boughs of trees, and dust, and if of greater violence dealing out flashes and balls of lightning as it moves slowly along over the country.

From a report sent to the *Avalon Independent* it appears that at about 4 o'clock on June 9th a small whirlwind was formed near Glastonbury, which carried up 40 or 50 tiles from some cottages, and also conveyed a basket some distance through the air. It then seems to have gone up again to the clouds, but may have been the commencement of the one which visited Bridgwater a little later.

From what we can gather, the Bridgwater whirlwind was formed not far from Dunwear, or between that place and Chedzoy, in the form of a long "tail" of black vapour hanging from the clouds, that

it then moved towards Chedzoy ((*i.e.*, was going N.), where it was met by an advancing storm cloud, into which it seemed to merge, and then to turn back again towards the south, and immediately to lower itself among the tree tops with a roaring noise. We have been told that two men were milking cows in a shed near Dunwear, and that the whole covering of the shed was removed, leaving only the skeleton, but we have not seen it. As the revolving wreaths of cloud drove through the trees, they fell before it in rows, until in a few moments about forty trees were uprooted or snapped off in a space of about a quarter of a mile square. The centre of the cyclone seems to have passed down a ditch, where it has levelled the rushes and grass as if a torrent of water had rushed down the "rhine."* Further on southwards is a small orchard, and here all the larger trees were torn to pieces, and then the wind passed along a lane, leaving very distinct traces in the hedge where the brambles and grasses were flattened and tumbled about in a very curious manner. At the end of this lane is a cottage facing south, and the wind coming up behind it (*i.e.*, going S.), or the sucking force exerted by the ascending whirl, blew out most of the windows into the garden, but fortunately did not unroof the house. From here the storm must have pretty nearly followed the course of the lane from East Bower to Dunwear (*i.e.*, going S.) as several trees are broken and uprooted as far as Mr. May's farm.

At the Bridgwater station the newspapers were scattered all over the platform, and the carriage works had a narrow escape from being unroofed, and some amount of damage was done. Passing over the low ground, the whirlwind next touched the trees round Mr. F. J. Thompson's grounds at Hamp, S.S.W. of Bridgwater, some apple trees were uprooted, and an elm was snapped off at some height from the ground, many smaller boughs were broken in the plantation near; and from an oak tree a large limb was wrenched off and flung over among the other boughs. The writer was at this moment, 4.25 p.m., standing at the end of Northfield (a street on the west side of Bridgwater), where the crashing of the falling trees could be distinctly heard, and the whirling clouds, and wind waving the distant trees had a very strange and awe-inspiring appearance.

In the lower part of Bridgwater the clouds seemed almost to touch the roofs, and the drifting masses of dark vapour were thought by many to be caused by a great fire near by. No doubt the phenomenon appeared under very different aspects at different stations, but from Northfield the sequence of events was in some such order as this :—At first a heavy thunderstorm passed from east to west, apparently between us and North Petherton, and in its rear another rapidly formed in the east and north-east. This then divided, part going towards the north, the other towards the south, while the whirlwind passed between them, the higher mountainous clouds

* Local name for a drainage stream on the level moors.

moving very slowly, and towering high into the air, whilst below, torn shreds of vapour were being whirled from all points of the compass, the centre of the storm especially being most marked, the clouds seeming to be rolled up and drawn into the intensely black thundercloud in the south, while in a few moments it cleared as if by magic in the north and east, as the rushing wind swept over the neighbouring trees. Both sections of the storm then seemed to join again, apparently over Combwich, and loud peals of thunder and bursting reports like cannon came from the solid black mass which entirely hid the distant hills while torrents of rain fell over Cannington and neighbourhood. One of the strangest parts of the phenomenon was the unearthly humming sound, caused by the whirlwind after it had again risen into the thundercloud, and which was plainly audible from the low fields for a considerable time in the distance.

The rainfall here was under half-an-inch for the whole 24 hours, and none fell during the whirlwind or immediately after, and at present no accurate record has been sent us as to the amount which fell where the storm passed subsequently. H. C.

[The above appeared in the *Bridgwater Independent* of June 13th, 1896, but has been specially revised by the writer before publication in the *Met. Mag.*—ED.]

EASTBOURNE, AUGUST 4TH.

At about ten minutes to one yesterday afternoon (Aug. 4th) some excitement was caused on the sea front at Eastbourne by a whirlwind, which, though confined to a very limited area, caused damage to several boats. The first gust of wind nearly sank a sailing boat which was lying at anchor about 100 yards from the shore. The mizen sail was torn off. Three rowing boats belonging to Mr. Sayers, and lying near the groyne opposite the East Sussex Club, were blown into the air, and whirled along as if they were paper kites. They were carried towards the end of the groyne, opposite the Victoria-place steps. A lady sitting on this groyne had a narrow escape. Had she not been blown off before the boats reached the spot where she was sitting, she must have sustained serious injury. Two of the boats, the Wave Queen and the Dauntless, were so much damaged that they had to be at once removed from the beach for repairs. The timbers of the third boat, the Sunbeam, were broken in one part, or loosened, and some of the stanchions were forced out. About a dozen persons, adults and children, were thrown down by the force of the wind, among them being some men who ran after the boats when they saw them flying through the air. The hats of people on the beach were blown off, and newspapers and pieces of paper were carried to a great height. In addition to the boats mentioned, a rowing boat belonging to Joseph Mockett was turned upside down. According to an eye-witness, the whirlwind seemed confined to a space of only a few yards wide.—*Standard*, August 5th.

REVIEWS.

Anales de la Oficina Meteorologica Argentina, por su Director G. G. DAVIS. Tomo ix. (2 parts) and x., 4to. Buenos Aires, 1893-6.

IT is impossible, in the space allotted, to do justice to these three portly volumes. We can only briefly indicate their contents. The first part of volume ix. is devoted to a brief description (unfortunately without a plan or a map) of Cordoba and its observatory, and to the printing in extenso of the majority of the observations taken there. It also contains the Director's report for the year 1889, with abstracts of the observations for that year at 16 stations, and the monthly rainfall at 27 stations on the Ferro-carril del Sud. We note that Dr. Davis has started an evaporation tank at Cordoba, somewhat smaller than, but much like those at Southampton and Camden Square, 3ft. 3in. × 3ft. 3in. instead of 6ft. × 6ft., but deeper, 2ft. 8in. instead of 2ft. The quantities in 1889 were—

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total.
Tank ...	(4·70)	2·66	3·74	2·85	1·88	1·81	2·77	3·18	3·88	5·54	5·57	5·31	... 43·89
Copper..	5·97	3·37	4·80	3·51	3·07	2·93	3·88	6·33	8·17	9·82	7·85	8·13	... 67·83
Ratio ...	1·27	1·27	1·28	1·23	1·63	1·62	1·40	1·99	2·10	1·78	1·41	1·53	... 1·55

This series of observations promises important information. We find in another part of the volume the totals for four subsequent years, adding 1889 (for which we computed the value for January) we have—

1889.	1890.	1891.	1892.	1893.		Mean.
43·89	51·52	40·59	44·45	39·15	.....	43·92 in.

Further on we find that Dr. Davis has attached recording apparatus to the tank, which apparatus is so delicate that he has to apply a correction for the expansion of the water in the tank due to the diurnal range of temperature. We do not dispute the necessity for this, but we should have thought that, if that has to be allowed for, there should be another correction applied for the size of the tank, for certainly its sides are longest when the water is hottest; and, therefore, when the water swells with temperature the tank gets larger. We doubt whether this correction may not be a case of "straining at a gnat," &c.

The volume is most interesting; one could spend hours over it and its diagrams—some of the latter are original and good.

Volume x., besides the annual reports for 1890 and 1891, gives summaries of all the observations hitherto made at—

Salta	Lat.	24°	32′	S. ;	Lon.	66°	14′	W. of G.
Tucuman	,,	26	50	;	,,	66	12	,,
Carcarana	,,	39	49	;	,,	61	8	,,
Villa Maria	,,	32	25	;	,,	63	14	,,

U.S. Department of Agriculture. Weather Bureau. Report of the Chief of the Weather Bureau, 1894. Government Printing Office, Washington, 1895 4to, 288 pages.

VERY similar to the volumes reviewed on p. 184 of our last volume, but noteworthy as being the first signed by the new chief, Prof. W. L. Moore.

It gives very little information respecting the operations of the office, possibly the details are given in some other document. We are glad to see a list of the publications up to date, such lists are always useful. Another new practice (we think adopted in the previous volumes of this series, but not mentioned in our review) which is very handy, is the binding of a leaf of strongly coloured paper between each section of the report, so that a glance at the edges shows where to turn to.

The tables of rainfall still give no information as to kind of rain gauge, or as to the height above the ground, or the altitude of the station. We do not understand why so very large a proportion of the stations are not complete for the year. We give the figures for the first six states :—

	Total Stations.	Perfect.	Imperfect. No.	Imperfect. Per cent.
Alabama	63	32	31	49
Alaska	5	2	3	60
Arizona.....	60	36	24	40
Arkansas	56	28	28	50
California.....	358	261	97	27
Colorado	98	48	50	51
Total.....	640	407	233	36

This shows that out of 1,000 stations, about 350 will be incomplete; more than ten times the proportion which are incomplete in this country. No matter how large be the total number of observers, there cannot be good work done as to secular variation, until this proportion of imperfect returns is reduced to a fifth, if not to a tenth, of what it was in 1894.

NEGATIVE RAYS AND THE AURORA.

A SERIES of experiments, relative to the action of a powerful magnetic field upon the negative rays in Crookes or Hittorf tubes, has been undertaken by Mr. Birkeland. These researches present some importance as regards the theory of the aurora borealis. M. Paulsen, the director of the Meteorological Institute of Copenhagen, claims that the aurora owes its origin to phosphorescence of the air produced in the upper regions of the atmosphere. Mr. Birkeland puts forth the idea that terrestrial magnetism may be the cause of such phosphorescence, which becomes intensified in the vicinity of the terrestrial poles.—*The Optician*, Aug. 20th.

HEAVY MONSOON RAIN IN SOUTHERN INDIA.

[WE have been favoured with the following letter from the Ven. Archdeacon Wynne, and we have reprinted the second from the *Sheffield Daily Telegraph*, of August 27th, as the similarity of the reports is striking. Fifty-one inches in eight days is very heavy, but we think that it was probably far surpassed by Cherra Poonjee in July, 1861, when the total for the month was 366·14 in., and in 1865, when the July fall was 208·40 in. We find that in the (for that station) dry month of August, 1851, 55·11 in. fell in the eight days ending August 14th. The fall at Nagina, Bijnore (lat. 29° N., lon. 78° E.), in September, 1880, reached 32·4 in. on one day, and 8·6 in. on the next, or 41 inches in *two* days. This was the rain which produced the disastrous landslip at Naini Tal. These stations it is true are in Northern India, whereas the following letters are from the South; but the rainfall on the Ghauts has long been known to be very heavy, for example, at Mahabuleshwur, in July, 1840, the total was 134·42 in.; and falls exceeding 10 inches per diem are frequent in June, July and August.—ED.]

RAINFALL IN THE ANAMULLAI MOUNTAINS, SOUTH INDIA.

SIR,—The mean annual rainfall in this station (Sothapara) is 75 inches. The greatest for some years was 108 in. in 1882. This year the fall was excessive. A letter just received says that the precipitation for June, 1896, was 75·78 in., and for July, 95 in. The greatest fall occurred in the eight days beginning with July 23rd. The daily record was as follows:—July 23rd, 6·79 in.; 24th, 8·25 in.; 25th, 5·05 in.; 26th, 4·65 in.; 27th, 6·28 in.; 28th, 5·87 in.; 29th, 6·23 in.; 30th, 7·93 in., making a total for 8 days = 51·05 in. Is this not a record?

Yours faithfully,

G. R. WYNNE.

Woodlawn, Killarney.

RAINFALL IN INDIA.

SIR,—In view of our deficient rainfall in England, some of your readers may be interested in hearing how their countrymen, coffee planters in India, are faring. I have letters before me from two correspondents in Mysore, whose plantations border the Western Ghauts. The monsoon (periodic rain and wind storms) began about June 15th, and from that date to August 1st there had been "130 inches of rain, or 25 inches more than our average annual rainfall; and we are only half-way through the monsoon. During the last eight days we have had 45 inches."

Thus in eight days the rainfall was considerably greater in Mysore than ours in England for the whole year. It is reported as "by far

the heaviest experienced during the last 25 years." At the same time "the wind has blown a hurricane for the last seven days, and we could hardly sleep, expecting each night that the roof would be blown off. Great damage has been done to the coffee estates; hundreds of shade trees torn up; numerous landslips, causing us the loss of about an acre of coffee trees here; roads washed away (on the hill sides); hardly a building but has suffered more or less."

So the lot of the British agriculturist abroad is not altogether a happy one, and by comparison the British climate after all is not one to grumble at. X.

August 25th, 1896.

WATERSPOUTS ON THE ATLANTIC.

One of the results of the remarkable weather which has prevailed across the Atlantic during the last two or three weeks has been the numerous waterspouts which have been observed by various vessels. One of these is described by Captain Friande, of the steamship Neustria, of the Faber line. A mass of dark clouds quickly gathered over the sky, and in a very little while the ship was in semi-darkness. The sea at the time was quite smooth, and the wind had fallen. Suddenly the most vivid lightning began to play incessantly, and the ship was encountering the most terrible electric storm ever experienced by the commander. Presently the lightning and thunder ceased, and as the ship emerged once more into the light, there was discerned about two miles away a rapidly moving waterspout whose base seemed about ninety feet thick, while its middle tapered to something like four feet in diameter, and its top was lost in the clouds. It approached within two hundred yards of the steamer, churning up the water as it moved, with a loud swishing sound. Many of the passengers were almost paralyzed with fear, expecting the column to overwhelm the ship, when suddenly it broke and came pouring down a little way astern, to be followed immediately by the growth of another one, which, however, did not approach the ship. In the same neighbourhood another ship, the London Hill, from Cochin, encountered another gigantic waterspout, which twisted and coiled and untwisted for some time, before it finally broke and fell into the water.

—*Daily News, August 31st*, 1896.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MARCH, 1896.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	65·2	22	29·4	15	53.3	39·9	41·0	83	103·2	24·9	3·20	25	7·3
Malta	68·7	29	46·2	13	63·6	54·1	50·1	82	132·3	40·0	1·03	8	6·3
Mauritius	84·4	3	68·6	15	82·1	72·1	68·9	79	134·8	61·4	3·51	15	5·8
Calcutta	101·2	28*a*	63·1	1	93·9	71·7	63·9	56	155·4	54·5	·15	1	1·9
Bombay	91·9	24	69·4	10	86·1	74·2	70·5	73	139·3	57·4	·00	0	0·9
Ceylon, Colombo	92·7	21	70·5	1	90·7	75·2	72·8	78	162·0	62·4	5·64	11	3·7
Melbourne	95·0	7	38·8	31	71·6	54·1	53·7	80	144·0	29·5	1·96	8	6·4
Adelaide	104·4	10	49·2	20	83·2	61·1	50·5	47	157·8	39·1	·43	3	5·2
Sydney	80·9	5	52·6	31	74·3	63·4	61·0	76	141·8	43·7	3·57	14	5·2
Wellington	75·0	24	42·0	13	65·9	55·3	52·2	74	134·0	35·0	8·29	17	5·0
Auckland	78·0	21	51·0	15	72·1	58·1	54·8	70	145·0	47·0	1·18	9	4·8
Jamaica, Kingston	89·3	29	65·1	5	85·8	69·0	66·0	74	...	...	·18	4	2·7
Trinidad	91·0	25*b*	61·0	15	87·7	68·8	69·6	76	174·0	60·0	1·59	11	...
Grenada	85·2	30	69 0	16	82·7	72·1	67·8	71	161·8	...	3·70	14	2·1
Toronto	53·1	29	4·8	13	31·0	15·6	19·0	76	70·2	—1·0	2·49	12	5·0
New Brunswick, Fredericton	54·8	26	—9·3	15	34·3	14·3	19·4	70	...	...	5·81	17	5·3
Manitoba, Winnipeg	48·9	27	—27·2	12	25·0	—0·2	...	...	...	...	1·85	14	4·7
British Columbia, Esquimalt	59·3	19	22·2	2	48·6	34·4	36·1	83	...	...	1·71	13	6·6

a—and 29. *b*—and 26.

REMARKS.

MALTA.—Adopted mean temp. 57°·0, or 1°·3 above the average. Mean hourly velocity of wind 12·1 miles. Average temp of sea 59°·0. Thunderstorm on 3rd; lightning on 30th. Dew-point ranged from 56°·3 to 42°·0. J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·2 below, of dew point 0°·9 below, and rainfall 4·98 in. below, their respective averages. Mean hourly velocity of wind 10 miles, or equal to average; extremes, 23·2 on 8th, and 2·2 on 14th; prevailing direction, E.S.E. Lightning on 5th and 22nd; thunder on 28th and 29th. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms occurred on the 9th, 10th, 26th and 29th. Lightning was seen on the 11th, 23rd, 24th and 27th. D. G. MANTELL.

Adelaide.—Mean temp. 1°·7 above the average of 39 years. A very dry month; rainfall ·64 in. below the average. C. TODD, F.R.S.

Sydney.—Rainfall 1·87 in. below, temperature 0°·4 below and humidity 0·7 below, their respective averages. After very dry weather during the whole of 1895, and January, 1896, excessively heavy rains (in one case 12 inches in six hours) fell over a small area, and since that the drought has set in again. H. C. RUSSELL, F.R.S.

Wellington.—Generally fine up to the 13th, with occasional showers and fresh N.W. wind; from 12th to 20th showers and strong N.W. winds; from 23rd to 27th heavy rain, wind S.E. Thunder on 26th and 31st; fog on 26th, 27th and 31st. Altogether an unpleasant month. Rainfall 4·75 in. above, or more than double, the average. R. B. GORE.

Auckland.—An unusually fine and dry month, the rainfall being much less than one-half the average. Mean temp. considerably above the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—In Kingston, the weather was fair. Mean hourly velocity of wind 4·2 miles. Rainfall one-fourth of the average. R. JOHNSTONE.

TRINIDAD.—Rainfall ·28 in. below the 30 years average. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, AUGUST, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	2·51	XI.	Lake Vyrnwy	2·44
,,	Birchington, Thor	4·06	,,	Corwen, Rhug	1·92
,,	Hailsham	1·88	,,	Llanystumdwy, Talarvor	2·68
,,	Ryde, Thornbrough	2·21	,,	I. of Man, Douglas	2·25
,,	Emsworth, Redlands ...	2·03	XII.	Stoneykirk, Ardwell Ho.	1·92
,,	Alton, Ashdell	2·67	,,	New Galloway, Glenlee	2·32
III.	Oxford, Magdalen Col..	2·96	,,	Lilliesleaf, Riddell	1·72
,,	Banbury, Bloxham	1·72	XIII.	N. Esk Res. [Penicuick]	2·20
,,	Northampton, Sedgebrook	2·35	,,	Edinburgh, Blacket Pl..	1·79
,,	Alconbury	1·49	XIV.	Glasgow, Queen's Park..	1·64
,,	Wisbech, Bank House...	2·20	XV.	Inverary, Newtown	4·35
IV.	Southend	2·53	,,	Oban, The Corran	...
,,	Harlow, Sheering..... ...	4·16	,,	Islay, Gruinart Schools..	...
,,	Colchester, Lexden	3·26	XVI.	Dollar.....	1·96
,,	Rendlesham Hall	2·14	,,	Balquhidder, Stronvar...	3·49
,,	Rushall Vicarage	1·37	,,	Ballinluig	1·88
,,	Swaffham	1·98	,,	Dalnaspidal H.R.S.....	3·19
V.	Salisbury, Alderbury ...	2·09	XVII.	Keith H.R.S.....	3·61
,,	Bishop's Cannings	4·31	,,	Forres H.R.S.	1·96
,,	Blandford, Whatcombe .	1·67	XVIII.	Fearn, Lower Pitkerrie..	1·72
,,	Ashburton, Holne Vic...	2·00	,,	N. Uist, Loch Maddy ...	4·88
,,	Okehampton, Oaklands.	2·49	,,	Invergarry.....	3·45
,,	Hartland Abbey	1·98	,,	Aviemore H.R.S.	1·95
,,	Lynmouth, Glenthorne.	1·40	,,	Loch Ness, Drumnadrochit	1·78
,,	Probus, Lamellyn	1·87	XIX.	Invershin	2·98
,,	Wellington, The Avenue	1·95	,,	Scourie	7·40
,,	Wincanton, Stowell Rec.	2·03	,,	Watten H.R.S.....	1·92
VI.	Clifton, Pembroke Road	2·15	XX.	Dunmanway, Coolkelure	2·46
,,	Ross, The Graig	1·05	,,	Cork, Wellesley Terrace	1·19
,,	Wem, Clive Vicarage ...	1·56	,,	Killarney, Woodlawn ...	3·83
,,	Cheadle, The Heath Ho.	2·58	,,	Caher, Duneske	1·98
,,	Worcester, Diglis Lock	1·38	,,	Ballingarry, Hazelfort...	1·75
,,	Coventry, Coundon	2·29	,,	Limerick, Kilcornan ...	2·38
VII.	Ketton Hall [Stamford]	1·47	,,	Broadford, Hurdlestown	2·28
,,	Grantham, Stainby	1·93	,,	Miltown Malbay	4·20
,,	Horncastle, Bucknall ...	1·32	XXI.	Gorey, Courtown House	·81
,,	Worksop, Hodsck Priory	1·67	,,	Athlone, Twyford	2·66
VIII.	Neston, Hinderton	3·26	,,	Mullingar, Belvedere ...	2·06
,,	Southport, Hesketh Park	2·38	,,	Longford, Currygrane...	2·88
,,	Broughton-in-Furness ...	4·78	XXII.	Woodlawn	2·71
IX.	Ripon, Mickley.....	2·48	,,	Crossmolina, Enniscoe ..	4·05
,,	Melmerby, Baldersby ...	1·87	,,	Collooney, Markree Obs.	4·02
,,	Scarborough, Obs.	2·69	,,	Ballinamore, Lawderdale	2 29
,,	Middleton, Mickleton ...	2·05	XXIII.	Lough Sheelin, Arley...	2·64
X.	Haltwhistle, Unthank...	2·31	,,	Warrenpoint.....	1·40
,,	Bamburgh	2·10	,,	Seaforde..	1·60
,,	Keswick, The Bank	3·25	,,	Belfast, Springfield	2·73
XI.	Llanfrechfa Grange	1·81	,,	Bushmills, Dundarave..	3·07
,,	Llandovery	4·53	,,	Stewartstown	2·19
,,	Castle Malgwyn	3·40	,,	Killybegs	4·27
,,	Builth, Abergwesyn Vic.	4·66	,,	Lough Swilly, Carrablagh	4·22
,,	Rhayader, Nantgwillt...	4·11			

AUGUST, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·92	+ ·04	·37	24	14	77·1	13	45·4	27	0	0
II.		Maidstone (Hunton Court)...	2·82	+ 1·13	·90	9	10	...	...	...	...	..	...
,,		Strathfieldsaye	2·37	...	·68	19	15	...	...	...	...	...	...
III.		Hitchin	2·38	+ ·56	·49	31	15	73·0	13	42·0	4*e*	0	...
,,		Winslow (Addington)	2·90	+ ·93	·54	30	14	77·0	13	42·0	5,17	0	0
IV.		Bury St. Edmunds (Westley)	3·07	+ ·87	·64	27	15	72·0	13	43·0	27	0	...
,,		Norwich (Brundall)	1·64	...	·32	21	17	78·2	13	41·2	27	0	0
V.		Weymouth(LangtonHerring)	1·04	— ·89	·29	30	10	73·0	12*b*	46·0	27	0	...
,,		Torquay (Cary Green)	1·03	...	·20	30	11	76·4	23	46·2	27	0	0
,,		Polapit Tamar [Launceston]..	2·40	— ·08	·71	25	14	74·8	2	40·9	16	0	0
VI.		Stroud (Upfield)	2·13	+ ·04	·65	30	15	76·0	23	45·0	26	0	...
,,		ChurchStretton(Woolstaston)	1·34	— 1·42	·20	18*e*	18	70·5	11	43·0	26	0	...
,,		Tenbury (Orleton)	1·90	— ·22	·67	1	16	74·5	13	42·3	17	0	0
VII.		Leicester (Barkby)	2·99	+ ·55	·70	30	17	75·0	13	34·0	4	0	2
,,		Boston	1·65	— ·47	·31	19	15	75·0	13	42·0	5	0	...
,,		Hesley Hall [Tickhill].....	1·63	— ·53	·55	8	7	70·0	11*c*	41·0	28	0	...
VIII.		Manchester(PlymouthGrove)	2·69	— ·40	·85	23	19	73·0	17	39·0	26	0	...
IX.		Wetherby (Ribston Hall) ..	2·35	+ ·01	·69	31	10	...	...	...	...	...	...
,,		Skipton (Arncliffe)	2·72	— 1·61	1·13	23	15	..	...	...	...	...	...
,,		Hull (Pearson Park).	2·78	+ ·14	1·17	26	15	72·0	12*d*	41·0	26	0	...
X.		Newcastle (Town Moor)	2·00	— ·71	·43	14	17	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	8·73	+ ·28	1·95	23	21	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	3·00	— ·61	·87	19	15	...	...	...	...	...	...
,,		Haverfordwest	2·39	— ·79	·52	18	15	72·3	1	42·2	17	0	0
,,		Aberystwith (Gogerddan) ...	4·46	...	1·18	18	19	73·0	1	...	...	...	...
,,		Llandudno.....	2·81	+ ·45	·85	31	18	68·0	12	49·8	5	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	1·86	— 1·13	·52	29	10	71·8	11	40·0	10	0	0
,,		Jedburgh (Sunnyside).....	·85	— 1·39	·20	18*g*	9	74·0	11	39·0	10	0	...
XIV.		Colmonell	3·03	...	·62	12	13	71·0	1,12	39·0	4	0	...
XV.		Lochgilphead (Kilmory).....	3·83	— ·73	·55	17	17	...	...	40·0	4	0	...
,,		Mull (Quinish).....	6·36	+ 2·21	1·43	28	19	...	...	...	...	...	...
XVI.		Loch Leven Sluices	3·00	+ ·06	·90	24	12	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·85	— ·72	·55	23	18	73·0	11	40·2	26	0	...
XVII.		Braemar	1·63	— 1·70	·24	12*a*	21	69·8	11	32·8	10	0	3
,,		Aberdeen (Cranford)	2·41	...	·50	14	20	68·0	11	35·0	25	0	..
XVIII		Strathconan [Beauly]	3·15	— ·15	·50	31	14	...	...	...	...	...	...
,,		Glencarron Lodge.....	6·79	...	2·49	28	25	65·2	31	39·0	5	0	...
,,		Cawdor	2·09	— ·16	·40	7	18	...	...	...	...	...	...
XIX.		Dunrobin	...	...	...	..	...	...	..	...	...	...	...
,,		S. Ronaldsay (Roeberry).....	2·82	+ ·26	·68	28	21	63·0	18	43·0	16*f*	0	...
XX.	IRELAND.	Darrynane Abbey.....	2·82	...	·84	17	17	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	1·17	— 2·25	·27	26	12	74·0	12*d*	42·0	6	0	...
,,		O'Briensbridge (Ross)	2·93	...	·62	26	13	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	1·35	— 1·62	·27	25	12	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·14	— 1·38	·17	17	18	71·1	23	45·6	26	0	0
XXII.		Ballinasloe	2·30	— ·88	·66	23	16	71·0	1	42·0	6	0	...
,,		Clifden (Kylemore)	7·03	...	1·45	29	19	...	...	...	...	...	...
XXIII		Waringstown	2·57	— ·54	·70	18	15	75·0	1	37·0	30	0	0
,,		Londonderry (Creggan Res.).	3·73	— ·39	·76	25	20	...	...	...	...	...	...
,,		Omagh (Edenfel)	2·49	— 1·00	·48	23	21	66·0	1	35·0	9	0	...

+Shows that the fall was above the average ; —that it was below it.

a—and 14. *b*—and 24. *c*—and 12, 13. *d*—and 13. *e*—and 26. *f*—and 25, 27. *g*—and 23.

METEOROLOGICAL NOTES ON AUGUST, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

ADDINGTON.—With one exception, the largest August rainfall since 1881, the exception being 1891, which gave nearly five inches. During the TS on the 26th a good deal of H fell in the neighbourhood, followed by a cold night.

BURY ST. EDMUNDS, WESTLEY.—The month was favourable for harvest work till the 18th; after that time much the reverse, the barley then cut is much grown and discoloured. About 5.30 p.m., on August 28th, a remarkably bright zenithal halo was seen for about ten minutes. The colours were quite as bright as any rainbow. Distant T on 8th and 26th; TS on 19th.

NORWICH, BRUNDALL.—The coolest August since 1888, and the driest since 1885; but few really warm summer days, and a great prevalence of cloud at times. L on 7th, 19th and 25th, and much T with L on the afternoon and evening of the 26th.

WEYMOUTH, LANGTON HERRING.—Mean temp. at 9 a.m. 60°·9, 1°·1 below the average. T on 8th; T and L on 26th. The total R for the first eight months of this year is 8·67 in., or only 52 per cent. of the average. The previous smallest rainfall for the first 8 months of the year was 11·24 in. in 1887. Smallest rainfall for consecutive days—

	in.		in.
Jan. 8 to Aug. 25, 1887, 230 days,	7·56	Dec. 31, 1895, to Aug. 16, 1896, 230 days,	7·73
„ 7 „ „ „ „ 231 „	7·92	„ 30, „ „ „ „ 231 „	7·73
		„ „ „ „ „ 31, „ 246 „	8·73
		Jan. 4, 1887 „ Sept. 6, 1887, 246 „	11·20

The drought of this year has been longer and more severe than that of 1887.

TORQUAY, CARY GREEN.—Rainfall 1·81 in. below the average; the fall of eight months, January to August, being 11·64 in. below the average. Mean temp. 61°·0, or 0°·4 below the average. Duration of sunshine 209 hours 25 mins., being 21 hours 45 minutes above the average. One sunless day.

POLAPIT TAMAR [LAUNCESTON].—The first three weeks were very dry, but during the last week 1·75 in. fell. The rainfall to the end of the month from January 1st is 7·77 in. below the average. Fogs on the 1st, 2nd, 11th, and 13th. Heavy TS at 2.45 p.m. on 1st; distant T on 2nd; heavy T and vivid L with R at 5.45 p.m. of the 8th.

STROUD, UPFIELD.—T on the 1st, 8th, 23rd and 26th; T and L on 25th.

WOOLSTASTON.—The dry weather continued till the 17th, after which R fell lightly almost every day. The harvest was secured in good condition by the end of the third week. Mean temp. 57°·3.

LEICESTER, BARKBY.—Rainfall gradually creeping up, total for year so far 13·75 in. Mean temp. for the month, 57°·4. L on 19th; T on 21st, 25th and 26th.

BOSTON.—The harvest was one of the earliest on record, new wheat being first shown in Boston market on the 5th, or 18 days earlier than the average of the previous 30 years; the yield and quality are both good.

MANCHESTER, PLYMOUTH GROVE.—No summer weather prevailed during the month, but upon the whole it was dull, cold and unsettled. Mean temp. 57°·5, the lowest for August since observations commenced in 1868, with one exception, namely August, 1885, which was the same.

HULL, PEARSON PARK.—TS on 19th, TS with H and R on the 26th.

WALES.

HAVERFORDWEST.—The temp. of this month was much lower than July; no extreme heat prevailed, and only on four days did the temp. exceed 70°,

but the nights, with one or two exceptions, were rather above the mean. Although the rainfall was small, yet the continual drippings from the 17th to the end of the month, in conjunction with the temperate heat and the bright sunshine, went a great way towards neutralizing the effect of the long drought. Grass lands recovered wonderfully, and root crops (probably resown in many places) promise to be good. Prevailing winds W.N.W. and N.W. TS on 1st. Aurora on 15th, 16th, and 27th. Fog on 23rd.

ABERYSTWITH, GOGERDDAN.—Very showery throughout the month.

SCOTLAND.

CARGEN [DUMFRIES].—The mean temp. of the month is 1°·5 below the average, and has only in seven, out of 37 years been lower. Rainfall is the lightest registered in any year since 1884, and has only four times been less since observations commenced in 1860. With the exception of ·12 in. registered on the 12th, the wet weather occurred entirely in the latter half of the month. The heavy R during the night of the 29th was coincident with a sudden rise of temp., and was accompanied by a severe gale from S.W. Easterly winds prevailed for 15 days, distant T was heard on 26th. Almost all the corn in the immediate district was in the stackyards by the 22nd, about four weeks sooner than last year. The turnip crop promises to be one of the best on record, and pastures have seldom been more luxuriant at this season, fears are, however, entertained respecting the potatoe crop, owing to the prevalence of "disease." Distant T on 26th.

JEDBURGH.—The weather was characterised by great dryness for August, with a good deal of sunshine. The result was that vegetation made great progress. The cereal crops were begun to be cut in the first week, and in the early districts the most of it has been stacked in the finest order, a very unusual thing in August. Potatoes and turnips promise well.

COLMONELL.—Rainfall 1·02 in. below the average of 20 years. Mean temp. 1°·1 below the average.

ABERDEEN, CRANFORD.—The month was cold, with little sunshine.

S. RONALDSAY, ROEBERRY.—A sunless damp month. Mean temp. 53°·1, or 0°·9 below the average of six years.

IRELAND.

DARRYNANE ABBEY.—A dry month. The first half fine and warm, the second rather cold. Strong northerly gale on 26th.

O'BRIENSBRIDGE, ROSS.—A splendid harvest month up to the 17th, but the latter part changeable, with strong gales, veering from S.W. to N.W. The nights cold.

DUBLIN.—A cool, breezy, showery month, with a remarkable prevalence of N. and N.W. winds. The amount of cloud was very large in the mornings, but the evening skies were much freer from cloud. Mean temp. 58°·3, or 1°·4 below the average. The rainfall was much below, while the rainy days were considerably in excess of, the average. High winds were noted on as many as 13 days, and attained the force of a gale on three occasions, 13th, 24th, and 30th. T occurred on the 26th. Lunar halos were seen on the 19th, 24th, and 27th. Temp. reached 70° in the screen on 2 days. H fell on the 26th.

WARINGSTOWN.—The first half of the month was very dry and hot, the second half wet and blustery.

OMAGH, EDENFEL.—The first half of the month was very fine, although cool and with occasional light showers, but from the 17th to the end there was constant cool, rainy, and sunless weather, delaying and interfering with what had promised to be an early and abundant harvest.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXIX.] OCTOBER, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

THE RAINFALL OF SEPTEMBER, 1896.

SEPTEMBER, 1896, has been so exceptionally wet that we should scarcely be justified in passing it over without special treatment. Moreover, its wetness has been accentuated by the fact that it has followed (I.) an exceptionally long dry period, and (II.) a long series of years without an excessively wet month, so that the short-memoried public has had time to forget what a wet autumn month is like.

We give, in addition to our usual tables of rainfall, a table showing the September total at about 100 stations, for which the average 1880-89 is available, the excess of the month's fall over that average and in a third column the fall expressed as a percentage of the average, which shows at a glance where the total was two-and-a half times, twice, or one-and-a-half times, the average.

Plotting on a map the percentages from this table, as well as similar percentages calculated for the 50 stations printed in the regular table, we see that over a large area in the South of England, extending from Kent to Somerset, about two-and-a-half times the normal amount of rain fell, while over almost the whole of the United Kingdom south of latitude 52°, the stations recorded more than twice the average, the exceptions being Cornwall and mid-Gloucester. Durham and Northumberland show a fall only slightly in excess; Newcastle Town Moor record being even less than the average. In the Fen country, also, the fall was not exceptional, but over the whole of the remainder of England may be said to be 50 per cent. or more in excess.

Over Scotland, generally, the rainfall may be taken as one-and-a-half times the average, but shading off to 125 per cent. in the west, and increasing to 175 per cent. north of latitude 57°.

In Ireland the month was decidedly wetter than in Scotland, having more than twice the average fall over nearly all the southern half of the country, 250 per cent. being exceeded at one or two stations. Towards the north the fall diminished, decreasing to about 125 per cent. in the extreme N.E.

It may be interesting to state that in the tables there is not one entry three times the average, and only one entry of a minus difference.

Rainfall of September, 1896.

Division.	STATION.	Total Rain.	Excess over Aver. 1880-89	Per cent. of Average.	Division.	STATION.	Total Rain.	Excess over Aver. 1880-89	Per cent. of Average.
		in.	in.				in.	in.	
I.	Muswell Hill	6·26	3·59	234	VIII.	Neston (Hinderton)	3·45	·62	122
II.	Abinger Hall	8·00	4·85	254	„	Southport (Hesketh Park)	4·43	1·28	141
„	Guildford, Wern Stoke	6·09	3·33	221	IX.	Ripon (HighBank, Mickley)	3·98	1·39	154
„	Sevenoaks (RiverheadVic.)	5·48	2·59	190	„	East Layton	4·07	1·55	162
„	Steyning	8·10	4·76	243	„	Mickleton	3·44	·43	114
„	Hailsham	6·14	3·22	210	„	„ (Lime Kiln Pasture)	3·65	·57	118
„	Alton (Ashdell)	8·24	5·05	258	X.	Haltwhistle (Unthank Hall	4·58	1·16	134
„	Newbury (Welford Park)	6·04	3·40	229	„	Keswick (Bank)	7·81	2·30	142
III.	Kensworth [Dunstable]	6·19	3·39	221	„	„ (Derwent Island)	8·07	3·25	167
„	Slough (Upton Hall)	5·58	3·11	226	„	Grasmere (High Close)	11·10	4·20	161
„	Oxford (Mag. Coll. Laby.)	4·83	2·39	198	XI.	Llanfrechfa Grange	8·16	4·57	227
„	Banbury (Bloxham Grove)	4·85	2·17	181	„	Llandovery	8·08	4·02	199
„	Castle Ashby	6·00	3·43	233	„	CastleMalgwyn [Llechryd]	5·93	2·10	155
„	Pitsford (Sedgebrook)	4·74	2·14	182	„	Rhayader (Nantgwillt)	11·30	6·52	236
„	Wisbeach (Bank House)	3·93	1·00	134	„	Corwen (Rhug Gardens)	5·53	2·83	205
IV.	Harlow (Sheering)	6·19	3·65	244	„	Llanystumdwy (Talarvor)	5·79	2·30	166
„	Saffron Walden (Newport)	6·05	3·75	263	„	Douglas (Victoria Road)	5·59	1·42	134
„	Ipswich (Bishop's Hill)	4·97	2·33	188	XIII.	N.Esk Reserv. [Penicuick]	4·75	1·14	132
„	Rendlesham Hall	3·83	·87	129	„	Leith	3·25	1·27	164
„	Harleston (Rushall Vic.)	5·42	2·51	186	XIV.	Ardrossan	3·93	·88	129
„	Swaffham	5·34	2·34	178	„	Glasgow (Queen's Park)	4·71	1·72	158
V.	Salisbury (Alderbury)	6·21	3·67	245	XVI.	Dollar	5·19	1·90	158
„	Bishop's Cannings	5·90	2·96	201	„	Balquhidder (Stronvar)	7·90	2·56	148
„	Marlborough (Mildenhall)	6·59	3·94	249	„	Dunkeld (Inverbraan)	5·03	1·99	165
„	Swindon, New	5·26	2·89	222	„	Dalnaspidal, H.R.S.	8·19	3·43	172
„	Blandford (Whatcombe)	8·54	5·28	262	XVII.	Keith, H.R.S.	4·75	2·04	175
„	Ashburton (Holne Vic.)	9·33	4·56	196	„	Forres, H.R.S.	3·83	1·46	162
„	„ (Druid Ho.)	8·82	4·91	226	XVIII.	Fearn (Lower Pitkerrie)	3·83	1·95	204
„	Okehampton (Oaklands)	7·70	3·83	199	„	Loch Shiel (Glenaladale)	..	..	..
„	Barnstaple Athenæum	5·68	2·19	163	„	Aviemore, H.R.S.	4·38	1·98	182
„	Lynmouth (Glenthorne)	6·82	3·47	204	XIX.	Invershin	4·82	1·78	159
„	Probus (Lamellyn)	4·61	·94	126	„	Golspie, H.R.S.	4·34	1·86	175
VI.	Clifton (Pembroke Road)	7·35	4·33	243	„	Scourie	6·40	3·01	189
„	Lechlade	5·67	3·24	233	„	Watten, H.R.S.	4·09	1·61	165
„	Great Barrington	5·71	2·73	192	XX.	Pallaskenry (Kilcornan)	5·97	3·76	270
„	Cheltenham (SouthamVil.)	4·67	2·05	178	„	Miltown Malbay	6·02	2·04	151
„	Tewkesbury (Upper Lode)	5·49	3·11	231	XXI.	Gorey (Courtown House)	5·54	2·62	190
„	Ross (The Graig)	5·93	3·43	237	„	Parsonstown (Birr Castle)	5·62	3·19	231
„	Cheadle (The Heath Ho.)	5·03	1·99	165	„	Athlone (Twyford)	5·53	2·28	170
„	Worcester (Diglis Lock)	3·66	1·22	150	„	Mullingar (Belvedere)	5·95	3·05	205
„	„ (Bevere Lock)	3·57	1·22	152	XXII.	Crossmolina (Enniscoe)	6·36	1·89	142
„	Droitwich (Holt Lock)	4·66	2·35	202	XXIII.	Warrenpoint(SummerHill)	5·09	1·89	159
„	Stourport (LincombeLock)	6·01	3·55	244	„	Seaforde	4·57	1·27	138
„	Coventry (Coundon)	4·75	2·01	173	„	Donaghadee	3·93	·79	125
VII.	Ketton Hall [Stamford]	3·75	1·06	139	„	Bushmills (Dundarave)	4·99	·97	124
„	Horncastle (Bucknall)	3·42	·85	133	„	Stewartstown (The Square)	5·33	1·79	151
„	Worksop (Hodsock Priory)	4·26	2·21	208	„	Buncrana (Rockfort)	5·76	1·97	152

The following additional records exceeding seven inches at stations in southern England are sufficiently remarkable to be worth quoting, though of course many larger totals could be given for stations in wet districts.

Middlesex	Hampstead, Branch Hill.....	7·38 in.
Surrey.....	Reigate, Woodhatch Lodge ...	8·09 ,,
	Wallington	7·20 ,,
Kent	Keston Tower	7·81 ,,
Sussex	Steyning	8·10 ,,
Hants	Ryde, Town Hall	7·80 ,,
	Botley, Curdridge.....	8·18 ,,
	Liss, Lingwood	9·11 ,,
Bucks	Great Marlow	7·11 ,,

That the great rainfall of the month was due more to persistent rain than to any one excessive fall is clearly shown by the following list, which includes all records received, of more than 2·00 in. in the rainfall day.

	in.			in.	
Haslemere, (Hazelhurst)...	2·21	*1st.	Seathwaite.....	2·53	17th.
Dorking (Fir Tor)	2·75	1st.	,, ...	2·11	22nd.
Reigate (Doods)	2·27	1st.	Borrowdale Vic., Rosthwaite	2·13	16th.
Keston Tower	2·62	1st.	Buttermere (Hassness) ...	2·33	17th.
Bury S. Edmunds (Westley)	2·10	1st.	Borrowdale Grange	2·40	17th.
Poole (Parkstone)	2·12	8th.	Builth (Abergwessin Vic.)	2·03	22nd.
Ashburton (Holne Vic) ...	2·08	21st.	Rhiwbryfdir-Oakley Quar.	2·70	23rd.
Liskeard (Wadeland Ter.)	2·02	21st.			

We conclude with extracts from reports with which we have been favoured by correspondents.

Maida Vale. September rainfall 4·72 in., or nearly half-an-inch more than the total for the first five months of the year.

K. J. MARKS.

Dorking, Fir Tor.—The total R for September is 9·73 in. This is far beyond any other month in 23 years, as much as 7·50 in. never having been gauged. F. TAYLOR.

Reigate, Doods.—I registered 8·73 in. of R on 22 days in September, being the maximum in any month during 14 years. The nearest approach to this was 7·00 in. in October, 1891. G. E. PYM.

Tenterden.—The wettest September for 30 years, R 5·69 in.; in September, 1866, 5·56 in. fell. R for the nine months of 1896 only 1·80 in. below average, but ponds are still low and some wells empty.

J. E. MACE.

Tunbridge Wells, Camden Park.—September R 6·71 in. on 25 days, the average for the month being 2·38 in., and the greatest fall previously 4·84 in., in 1885. For the first nine months of the year the total is 19·30 in., the average being 19·35 in. J. WESTON.

* This fall was incorrectly printed as occurring on 2nd in last month's *Mag.*

Chichester, Forest Side Vicarage.—September R 9·57 in. on 25 days, being 7·61 in. more than the average of the previous seven Septembers.

Crowborough, Observatory.—The past month having been the wettest September in 55 years (1842-96), I send the amount for Uckfield, 7·16 in., and Crowborough, 8·01 in. The next wettest September at Crowborough was in 1876, 5·59 in. The wettest Septembers in the Uckfield register were 1852, 6·54 in., and 1866, 6·12 in. Notwithstanding the above heavy fall the total of the 9 months of this year is 3·37 in. below the average. C. LEESON PRINCE.

Long Wittenham.—The wettest September registered in 46 years. September, 1866, 5·60 in.; September, 1876, 5·57 in.; September, 1896, 5·98 in. F. C. CLUTTERBUCK.

Broxbourne.—The wettest month (R 6·17 in.) since July, 1880, when more than seven inches fell. G. J. NEWBERY.

Castle Ashby.—The heaviest September rainfall (6·00 in.) since the record commenced in 1873, the nearest being 5·65 in. in 1876. The only months exceeding six inches are July, 1880, 7·36 in., and October, 1891, 6·33 in. R. G. SCRIVEN.

Ipswich, Clare Lodge.—Rainfall for September, 6·04 in., five times the average of the previous six Septembers, and exceeding every other month but October, 1892, when 6·64 in. fell. On 1st, 2·35 in. fell between 9 a.m. and 3 p.m. E. R. TURNER.

Poole, Parkstone.—Rainfall, September, 1896, 9·23 in., max. fall 2·12 in. on 8th. Average for 14 years, 2·21 in., greatest previous fall, 4·77 in., in September, 1883. Total fall January 1st to September, 30th, 20·16 in.; average for 14 years, 19·41 in. Greatest monthly fall, 1882-95, 8·80 in., in October, 1891. R. H. BARNES.

Clifton, Pembroke Road.—The wettest September (R 7·35 in.) in 40 years, with the exception of 1874 (7·40 in.) and 1868 (7·68 in.). Rainfall considerably more than the total for the preceding five months. R. F. STURGE.

Ross, The Graig.—The following have been the wet Septembers since 1818, in Herefordshire:—

1839	5·57 in.	1866	5·91 in.	1869	5·85 in.
1841	5·80 ,,	1871	6·62 ,,	1876	6·86 ,,
				1896	5·93 ,,

In 1871 and 1876, September, with a greater depth of R than in 1896, had much fewer rainy days. H. SOUTHALL.

Rotherby Hall.—R fell on every day in September, making the total 3·45 in. J. HAMES.

Neston, Hinderton.—September, 1896, is the only month with 27 rainy days since observations commenced in 1868. R. BUSHELL.

Bolton, The Park.—Total R 9·14 in.; 5·34 in. above the average, and 3·95 in. more than that of any September in the preceding 11 years. W. W. MIDGLEY.

Aysgarth Vicarage.—We had 6·02 in. of R in September, the average for 20 years being 3·00 in. This makes 25·89 in. for nine months, as against an average of 26·87 in. F. W. STOW.

Cork, Wellesley Terrace.—Rainfall more than double the average, and the greatest in September for at least 45 years. W. MILLER.

Broadford, Hurdlestown.—R more than double the average of 11 years, and the greatest on record for September. H. A. BENTLEY.

REVIEW

Report of the Director . . . . Liverpool Observatory, Bidston, 1895. Published by order of the Mersey Docks and Harbour Board. The Liverpool Printing . . Company, 1896. 8vo., 48 pages.

WE have had to abridge the title, otherwise it would have occupied many lines—perhaps the hint may be taken next year—it is enough to send a cataloguer into a fit.

Mr. Plummer is evidently bringing Bidston into good order, and his reports are both interesting and useful. While we are very thankful for what he gives us, we have a few suggestions to give him in return. We think that the latitude, longitude, and altitude of an observatory should always be given. It is rather amusing that he gives barometer readings uncorrected for altitude, and yet nowhere tells us what the altitude is, although he gives a table of corrections whence it could be computed.

In the tables of daily results there are a few facts which might be made clearer. "Mean temperature" is determined in many ways; at Bidston it is $\frac{M+m}{2}$ and this might with advantage be put at the top of the column. "Mean temp. of Evaporation" and "Amount of Cloud"; there is nothing to show whether these values are the means of several observations, or the values for 9 a.m. only. "Amount of rain" a — or ... is much clearer than 0·000; by the former one sees the rainy part of a month at once, with the 0·000 one has to look carefully; for the same reason we prefer ·412 to 0·412, because then, falls exceeding an inch are noticed at once.

The Appendix on Gales of Wind is interesting, but it would have been improved by an engraving of the Observatory, and a reproduction of part of the Ordnance Map shaded to show the configuration of the ground (*c. f.* Mr. Curtis's paper on the Holyhead anemometers). We are very glad that Mr. Plummer has given us the catalogue of wonderful pressures at Bidston, and we hope that before long, either by the erection of a Dines's tube anemometer, or in some other way, these records will either be substantiated or corrected.

SEVERE SNOWSTORM IN MELBOURNE, JUNE 22ND, 1896.

Australia is about as far S. of the equator as Arabia is N. of it. Snowstorms are not frequent in the Red Sea. The *Melbourne Argus* might, therefore, well use the strong word "unprecedented" at the beginning of the following note.

MELBOURNE, JUNE 23RD.

An unprecedented event in the history of the Telegraph branch, occurred yesterday, June 22nd, when telegraphic communication by every route from Melbourne to Sydney was completely interrupted through a heavy snowstorm which occurred over a wide area beyond Yass during the early hours of the morning, and brought all the lines down. There are nine different circuits between Melbourne and Sydney, besides some connections from Adelaide, and yesterday morning it was found that the whole of them had been interrupted. Though breakages on one or more of the lines between the Victorian and New South Wales capitals have frequently occurred in the past, such a thing as a general stoppage of telegraphic communication has never been known before. When the exact position of matters was ascertained the public were notified that any messages lodged would be liable to delay, consequently fewer telegrams were received than usual, and it is hoped that business may be dealt with by making use of the trains to and from Sydney, which will carry the telegrams over the break which has occurred. Gangs of linemen have been despatched from Sydney to effect the necessary repairs.

SYDNEY, JUNE 23RD.

Last night provided the coldest weather of the year in Sydney, and exceptionally low temperatures prevailed in other parts of the colony. The thermometer registered in the city at daybreak 42·5 deg., and rose only a few degrees during the whole day. Heavy falls of snow occurred over all the central high lands, the drifts being of sufficient depth at Lawson to stop the passage of the train for over an hour, until the line could be cleared by gangs of workmen. The weight of the snow on the trees broke down several strong saplings.

Dubbo, Cootamundra, Murrumburrah, and stations as far north as Walcha all reported snow as falling.

The weight of the snow broke down last night long lengths of telegraph lines between Picton and Wagga, and was responsible for a complete stoppage of telegraphic communication with Victoria, South Australia, and Tasmania, as well as with all stations south of Picton.

The mountain ranges presented a beautiful spectacle to-day, the heights being hidden in a glistening white mantle of snow. The weather in the country is said to have been the most severe experienced for 20 years.

The tempestuous weather continued to-day (23rd) over the whole of the high lands and coastal districts. Falls of snow are reported from many country districts where snowstorms were previously unknown. Heavy seas are raging along the coast, compelling many vessels to seek shelter. The rainfall for the past two days in Sydney is over three inches, and that for the month is almost the heaviest on record.

THE FROST OF FEBRUARY, 1895.

WE do not profess to remember all the meteorological literature even of one year, but the impression at present occupying our mind is that the exceptional frost of 1895 has not received the study and attention it deserves. It seems to us that the Central Bureaux and the Societies which have numerous stations reporting to them are mostly overworked, so that the respective staffs have as much as they can do to bring out (often terribly after date) vast masses of mean values (which are seldom utilized), and, therefore, that when exceptional phenomena occur no one has time to work up the details, and so the lessons of the event pass unutilized. We have just received a copy of Mr. Mossman's paper,* with its beautiful maps, and we have been trying to see which of the great Government offices or which of the Societies has brought out anything analogous.

We began with the most ably conducted meteorological journal, the *Zeitschrift*, but we have found only a page and a half, and of it only part original, part taken from the *Met. Mag.*, part from a note read by M. Renou at the Paris Academy (which we have not seen). The *Quar. Jour. of the R. Met. Soc.* gives a paper by Messrs. Bayard and Marriott, excellent, if we must not say perfect, as regards England and Wales, and good as regards the whole British Isles, but without a line as to what had occurred on the Continent. In the *Annuaire Soc. Met. de France* Dr. Giraux gives a short note on the frost in the Department of la Marne. In *Ciel et Terre* we have (*a*) a great development of the *Revue Climatologique* usually given by M. Lancaster, and (*b*) a paper by M. Marchal on *Les grands froids observés en Belgique*—a useful historical memoir. Our readers will find several articles upon the frost and its effects in the last volume of the *Met. Mag.*

Mr. Mossman is, therefore, as far as we can trace, the only writer who, besides reporting fully what occurred in his own country, has made the faintest attempt to show why that frost occurred, and what were the leading features of the distribution of pressure over Europe which caused it.

We feel quite sure that it is a mistake to have so many stations that publication of the records falls behind (we have just received one volume referring to 1893!), and that, when an exceptional phenomenon occurs, there are no assistants who can be set to work upon it. We hope that someone will take up the subject, not from a local standpoint, but from a European or a cosmical one; and if we are to wait until the annual volumes are all out in 1898 or 1899, better so than not at all. But why are meteorological publications so behind? Surely because the Directors have too many stations.

Mr. Mossman's paper is very interesting. He shows that, as regards mean temperature, out of 132 years only 5 Januaries were

* *The Frost of* 1895 *in Scotland.* By R. C. MOSSMAN, F.R.S.E., Excerpt *Jour. Scot. Met. Soc.*

colder, and only one (1855) February. For the two months the mean for 1895 (30°·1) was not merely 1°·1 below any previous year, but actually the coldest two months for 132 years. The author gives full details of the frost in Scotland, and of the distribution of its intensity, which is elucidated by a map; but meteorologists who wish to know not merely facts but also causes, will be still more attracted by the charming map of the mean pressure over Europe during the week when the frost was most severe. Mr. Mossman has based this upon the data in the *Bulletin International*, and it shows very plainly the existence of a large high pressure area (about 30·5 in.) at the top of the Gulf of Bothnia.

It will, perhaps, be remembered that the subject of earth temperatures and burst waterpipes was fully discussed in these pages. Mr. Mossman gives much additional information. It was much colder in Scotland than in England, yet there are only two stations which report temperatures at 22 inches deep below 32°, and they were Arbroath, 31°·5, and Poltalloch, 31°. At 2 ft. it would, of course, have been a shade warmer. This may surely be regarded as confirmatory of our statement (*Met. Mag.*, 1895, p. 55).

"Looking back over all the thermometric records, we adhere to our original opinion that at no spot in England did the natural soil in its normal condition become frozen at the depth of 2 ft."

Why water-pipes at that and greater depths burst to such an extent as to cost £50,000 or £100,000 to repair is indicated in the above article, and that argument has not, that we are aware, been controverted.

A LUNAR RAINBOW.

To the Editor of the Meteorological Magazine.

SIR,—While standing on the highest point of the cliffs at Trimingham, in Norfolk, on September 16th, at 8.30 p.m., I observed the somewhat rare phenomenon of a lunar rainbow. Starting from the Cromer, or N.W. direction, and arching over the edge of the cliff towards the little village of Mundesley, the arc lengthened gradually for four or five minutes, until it was a complete bow, both ends reaching the horizon; it remained complete for a minute or two, and then gradually faded out, the northerly end disappearing first. The bow was quite colourless, looking only a milky white upon a fine grey mist lying over the sea. It was, however, quite clearly defined, and appeared to be of the width and radius of an ordinary solar bow. The moon was at an altitude of about 22°, and during the greater part of the time partially covered with a small cloud. The cliffs at Trimingham are 300ft. above the level of the sea.

Yours truly,

E. WHITE WALLIS.

76, *Carlton Hill, N.W., October 8th*, 1896.

WHIRLWINDS, CYCLONES AND TORNADOES.

To the Editor of the Meteorological Magazine.

SIR,—The terminology in the extract on "Whirlwinds," from the *Bridgwater Independent*, of June 13th, 1896, reprinted in the *Meteorological Magazine* for September, pp. 117–119, is somewhat confusing to an American. The writer of that article speaks of a "small cyclone or whirlwind" which visited the neighbourhood of Bridgwater on June 9th, and says, "this somewhat rare phenomenon must not be confounded with the ordinary cyclonic disturbance or 'depression' which is the usual cause of the low barometer, rain and gales of the winter months, and which is generally of sufficient size to cover the whole of the British Isles." He then speaks of "the true whirlwind or cyclone, of which we have recently received such terrible accounts from America."

The confusion here is in the wrong use of the word *cyclone* *Cyclone* should be used only to designate the cyclonic disturbances, depressions, or LOWS, which bring us what, in ordinary conversation, we speak of as storms. These, as the writer above-quoted recognizes, are generally of sufficient size to cover the whole of the British Isles. The much smaller revolving storms, which are distinguished by having a narrow path, seldom over half-a-mile wide, which last at most but an hour or two, and which are comparatively rare in the British Isles and on the Continent, should be called "tornadoes." These are much more frequent and more violent in the United States than anywhere else, and have for that reason, and also because of Finley's thorough study of them during past years, come to be regarded as rather distinctively American phenomena. The "terrible accounts" of damage done in the United States during the past spring and early summer, to which the writer of the article on "Whirlwinds" refers, were accounts of destruction wrought by "tornadoes" and not, as he says, by "cyclones."

Meteorologists in this country as a rule now use the word whirlwind only when speaking of desert or dust whirls. Scott, in his "Elementary Meteorology" (pp. 381–2, 384–5), confines the use of the word tornado to the thunder squalls off the West Coast of Africa, and uses whirlwinds for such phenomena as that at Bridgwater on June 9th last. He apparently makes no mention of our American tornadoes. In Moore's "Meteorology" the word tornado is rightly used on pp. 241–2, in describing a small revolving storm which occurred in Dublin, April 18th, 1850. Dickson ("Meteorology," pp. 89 *et seq.*) includes under whirlwinds, desert whirls, waterspouts and tornadoes, but distinguishes between cyclones and tornadoes, and gives somewhat over a page to a description of our American tornadoes.

As the Bridgwater tornado was but a very weak affair in comparison with most of our American tornadoes, it is perhaps rather natural to prefer the use of the word "whirlwind" in describing it, rather than to use the more formidable "tornado." I believe, however, that it would be well always to use the term "tornado" to designate any revolving storm, of small diameter, which has the characteristics of an American tornado, *e.g.*, the funnel-shaped cloud, the destructive inflowing and ascending winds, the accompanying thunderstorm, &c. There are, of course, tornadoes of various degrees of development and of violence; that at Bridgwater was a very weak affair judged by our standards, but still, as far as I can determine by the reprinted account. it had many of the characteristics of the tornado, and should, I believe, be designated by that name.

Very truly yours,

ROBERT DE C. WARD, F.R.Met.Soc.

Harvard University, Cambridge, Mass., U.S.A., Oct. 1st, 1896.

[We think that most English meteorologists would fully concur with Mr. Ward; but we believe that to the general public cyclone and tornado are almost synonymous, and would be applied indifferently to any wind developing destructive energy.—ED. *M.M.*]

ISOBARS.

To the Editor of the Meteorological Magazine.

SIR,—In the September number of the magazine Dr. Hellmann asks "Who first used the word *isobar*?" and he suggests "perhaps Mr. Babington." In a foot-note you state that Admiral FitzRoy used the word *isobarometric* in 1863—the fuller and original form of the word—but I find that Alex. von Humboldt, in his *Cosmos*, wrote in the year 1843, twenty years earlier, as follows:—"If we connect together by *isobarometric* lines those places which present the same · · · · atmospheric pressure · · · · we shall obtain curves," &c.—*See* Otté's transl. 1st Ed., vol. i., p. 321.

Yours very truly,

J. LARDNER GREEN, F.R.Met.Soc.

Tintinhull, Milford Hill, Salisbury, October 6th, 1896.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, APRIL, 1896.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute.				Average.				Absolute.		TotalRain.		Aver.
	Maximum.		Minimum.										
	Temp.	Date.	Temp.	Date.	Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	68·4	26	32·8	24	58·6	41·5	40·3	71	114·7	24·0	·55	11	5·3
Malta	67·2	21	44·6	9	63·0	51·2	48·5	75	134·7	37·2	3·34	11	6·5
Mauritius	83·4	3	69·0	28	81·5	72·7	69·7	80	130·9	60·0	3·36	16	5·4
Calcutta	106·8	15	70·0	21	99·4	78·0	69·5	56	159·5	62·0	·05	1	1·3
Bombay	94·8	10	76·2	6	90·5	79·3	75·2	73	141·5	65·4	·00	0	2·1
Ceylon, Colombo	93·0	26	74·5	5	90·9	76·9	74·5	78	158·0	66·0	5·93	19	5·9
Melbourne	81·1	20	40·1	26*b*	67·7	50·0	48·4	69	127·9	31·5	2·71	12	5·5
Adelaide	89·9	4	46·0	28	73·0	54·4	49·2	59	142·1	36·4	3·00	14	5·2
Sydney	83·9	8	51·0	15	71·8	56·9	51·9	73	134·0	40·4	·15	3	2·4
Wellington	69·0	16	40·0	19	61·2	50·4	48·2	76	127·0	26·0	12·15	24	5·1
Auckland	78·0	1	47·0	18	68·2	55·1	51·5	70	131·0	38·0	7·20	20	5·8
Jamaica, Kingston	90·2	5	66·2	14	86·4	69·1	66·6	75	...	...	·86	5	4·0
Trinidad	93·0	24*a*	67·0	7, 8*c*	89·4	69·4	70·5	76	169·0	65·0	2·33	10	...
Grenada	86·2	12	71·0	13	82·9	73·4	67·2	71	155·0	...	5·91	15	3·1
Toronto	79·7	17	18·3	4	54·7	38·1	37·7	74	97·0	15·0	·76	14	6·0
New Brunswick, Fredericton	66·7	20	16·8	9	49·8	27·9	26·3	59	...	...	1·19	8	5·0
Manitoba, Winnipeg	75·3	26	−0·4	2	45·0	27·1	...	...	...	...	5·64	14	7·0
British Columbia, Esquimalt	64·1	24	29·2	3	53·1	38·7	39·8	82	...	...	1·08	14	7·0

a—and 28. *b*—and 27. *c*—20.

REMARKS.

MALTA.—Adopted mean temp. 56°·2, or 3°·6 below the average. Mean hourly velocity of wind 13·1 miles. Average temp of sea 60°·0. Thunderstorms on 8th, 10th and 28th. Lightning on 4th and 6th. Hail on 8th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·4 above, of dew point 1°·4 above, and rainfall 2·33 in. below, their respective averages. Mean hourly velocity of wind 9·4 miles, or 1·0 mile below average; extremes, 23·9 on 26th, and 0·0 on 18th; prevailing direction, E.S.E. Lightning on 3rd. Thunder and lightning on 4th, 15th, 16th, 20th and 21st. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms occurred on 15 days. Lightning was seen on 7 days. D. G. MANTELL.

Adelaide.—Mean temp. 0°·4 below the average of 39 years. Rainfall 1·26 in. above the average. C. TODD, F.R.S.

Sydney.—Rainfall 5·68 in. below, temperature 0°·1 below, and humidity 5·6 below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—A most unpleasant month; showery almost throughout, and some heavy falls of rain. Wind chiefly from S.E. and N.W., and frequently strong. Thunder on 1st, 2nd and 24th. Temperature 1°·2 below, and rainfall 8·63 in. above, their respective averages. R. B. GORE.

Auckland.—An unusually wet month, the rainfall considerably exceeding twice the average. Barometric pressure and mean temperature both slightly above the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 3·5 miles. Rainfall in Kingston and the Island generally one-fifth less than the average. Hail at Christiana on 28th. R. JOHNSTONE.

TRINIDAD.—Rainfall ·30 in. above the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, SEPTEMBER, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	8·00	XI.	Lake Vyrnwy	9·08
,,	Birchington, Thor	4·77	,,	Corwen, Rhug	5·53
,,	Hailsham	6·14	,,	Criceith, Talarvor.....	5·79
,,	Ryde, Thornbrough	9·52	,,	I. of Man, Douglas	5·59
,,	Emsworth, Redlands ...	7·89	XII.	Stoneykirk, Ardwell Ho.	3·80
,,	Alton, Ashdell	8·24	,,	New Galloway, Glenlee	6·30
III.	Oxford, Magdalen Col..	4·83	,,	Lilliesleaf, Riddell	5·42
,,	Banbury, Bloxham	4·85	XIII.	N. Esk Res. [Penicuick]	4·75
,,	Northampton, Sedgebrook	4·74	,,	Edinburgh, Blacket Pl..	4·47
,,	Alconbury	4·48	XIV.	Glasgow, Queen's Park..	4·71
,,	Wisbech, Bank House...	3·93	XV.	Inverary, Newtown	6·29
IV.	Southend	3·57	,,	Oban, The Corran	6·71
,,	Harlow, Sheering..... ...	6·19	,,	Islay, Gruinart Schools..	3·60
,,	Colchester, Lexden	4·32	XVI.	Dollar.....	5·19
,,	Rendlesham Hall	3·83	,,	Balquhidder, Stronvar...	7·90
,,	Rushall Vicarage	5·42	,,	Ballinluig	3·81
,,	Swaffham	5·23	,,	Dalnaspidal H.R.S.....	8·19
V.	Salisbury, Alderbury ...	6·21	XVII.	Keith H.R.S.....	4·75
,,	Bishop's Cannings	5·90	,,	Forres H.R.S.	3·83
,,	Blandford, Whatcombe .	8·54	XVIII.	Fearn, Lower Pitkerrie..	2·83
,,	Ashburton, Holne Vic...	9·33	,,	N. Uist, Loch Maddy ...	5·43
,,	Okehampton, Oaklands.	7·70	,,	Invergarry	5·59
,,	Hartland Abbey	6·42	,,	Aviemore H.R.S.	4·38
,,	Lynmouth, Glenthorne.	6·82	,,	Loch Ness, Drumnadrochit	4·01
,,	Probus, Lamellyn	4·61	XIX.	Inversbin	4·82
,,	Wellington, The Avenue	4·71	,,	Scourie	6·40
,,	Wincanton, Stowell Rec.	6·85	,,	Watten H.R.S.....	4·09
VI.	Clifton, Pembroke Road	7·35	XX.	Dunmanway, Coolkelure	10·81
,,	Ross, The Graig	5·93	,,	Cork, Wellesley Terrace	5·60
,,	Wem, Clive Vicarage ...	3·49	,,	Killarney, Woodlawn ...	8·46
,,	Cheadle, The Heath Ho.	5·03	,,	Caher, Duneske	4·87
,,	Worcester, Diglis Lock	3·66	,,	Ballingarry, Hazelfort...	5·64
,,	Coventry, Coundon	4·75	,,	Limerick, Kilcornan ...	5·97
VII.	Ketton Hall [Stamford]	3·75	,,	Broadford, Hurdlestown	5·28
,,	Grantham, Stainby	4·32	,,	Miltown Malbay	6·02
,,	Horncastle, Bucknall ...	3·42	XXI.	Gorey, Courtown House	5·54
,,	Worksop, Hodsck Priory	4·26	,,	Athlone, Twyford	5·53
VIII.	Neston, Hinderton	3·45	,,	Mullingar, Belvedere ...	5·95
,,	Southport, Hesketh Park	4·43	,,	Longford, Currygrane...	5·25
,,	Broughton-in-Furness ...	8·33	XXII.	Woodlawn	6·49
IX.	Ripon, Mickley.....	3·98	,,	Crossmolina, Enniscoe ..	6·36
,,	Melmerby, Baldersby ...	2·65	,,	Collooney, Markree Obs.	5·72
,,	Scarborough, Obs.	2·61	,,	Ballinamore, Lawderdale	...
,,	Middleton, Mickleton ...	3·44	XXIII.	Lough Sheelin, Arley...	4·80
X.	Haltwhistle, Unthank...	4·58	,,	Warrenpoint.....	5·09
,,	Bamburgh	3·58	,,	Seaforde.....	4·57
,,	Keswick, The Bank.....	7·81	,,	Belfast, Springfield	5·13
XI.	Llanfrechfa Grange	8·16	,,	Bushmills, Dundarave..	4·99
,,	Llandovery	8·08	,,	Stewartstown	5·33
,,	Castle Malgwyn	5·93	,,	Killybegs	7·97
,,	Builth, Abergwesyn Vic.	12·30	,,	Lough Swilly, Carrablagh	5·88
,,	Rhayader, Nantgwillt ...	11·30			

SEPTEMBER, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which '01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	5·51	+ 3·00	·73	12	22	71·9	8	39·6	21	0	0
II.		Maidstone (Hunton Court)...	7·71	+ 5·12	1·60	12	21	...	...	...	...	...	...
,,		Strathfieldsaye	6·60	...	1·01	24	26	...	...	...	...	...	...
III.		Hitchin	5·85	+ 3·35	1·06	12	23	69·0	5	37·0	20	0	...
,,		Winslow (Addington)	5·96	+ 3·29	1·10	12	22	69·0	8, 9	34·0	21	0	1
IV.		Bury St. Edmunds (Westley)	6·32	+ 3·62	2·10	1	21	66·0	9	42·0	30	0	...
,,		Norwich (Brundall)	3·63	...	·63	24	21	72·0	9	40·0	21	0	0
V.		Weymouth(LangtonHerring)	6·76	+ 4·34	·96	3	25	68·0	9	45·0	21	0	0
,,		Torquay (Cary Green)	5·45	...	1·08	21	28	67·1	26	45·6	21	0	0
,,		Polapit Tamar [Launceston]..	6·17	+ 2·46	1·43	8	24	66·8	10	38·0	21	0	...
VI.		Stroud (Upfield)	5·27	+ 2·36	·85	4	25	68·0	15	41·0	20	0	...
,,		ChurchStretton(Woolstaston)	4·96	+ 2·46	·86	24	26	67·0	10	41·0	28	0	...
,,		Tenbury (Orleton)	3·95	+ 1·34	·74	24	23	67·8	27	33·5	21	0	1
VII.		Leicester (Barkby)	3·73	+ 1·09	·70	24	29	72·0	9	33·0	20	0	1
,,		Boston	3·67	+ ·90	·73	12	20	71·0	10	38·0	21	0	...
,,		Hesley Hall [Tickhill].....	3·71	+ 1·55	·61	4	26	70·0	11	35·0	21	0	...
VIII.		Manchester(PlymouthGrove)	5·28	+ 1·81	·80	22	24	73·0	9,10	40·0	28	0	0
IX.		Wetherby (Ribston Hall) ...	4·67	+ 2·21	·97	10	21	...	...	...	...	...	...
,,		Skipton (Arncliffe)	8·89	+ 4·13	1·52	22	22	..	...	...	...	...	...
,,		Hull (Pearson Park).	3·83	+ 1·39	·63	24	20	70·0	13	36·0	21	0	1
X.		Newcastle (Town Moor)	2·27	— ·51	·70	25	17	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	15·26	+ 3·53	2·53	17	25	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	9·67	+ 5·93	1·53	21	25	...	...	...	...	...	...
,,		Haverfordwest	6·69	+ 2·29	1·25	21	25	66·3	12	38·0	21	0	0
,,		Aberystwith (Gogerddan) ...	7·28	+ 3·01	1·20	24	23	71·0	12	30·0	29	2	...
,,		Llandudno.....	4·77	+ 2·55	·84	4	24	68·0	10	43·8	21	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	5·50	+ 1·94	·92	24	18	70·4	1	34·0	21	0	0
,,		Jedburgh (Sunnyside).....	3·98	+ 1·29	·70	16	28	69·0	10	38·0	22*d*	0	...
XIV.		Colmonell	4·89	...	1·28	27	20	72·0	3	33·0	20	0	...
XV.		Lochgilphead (Kilmory).....	7·01	+ 1·88	1·30	18	21	...	...	35·0	20	0	...
,,		Mull (Quinish).....	5·78	+ ·75	·94	18	22	...	...	...	...	...	...
XVI.		Loch Leven Sluices	4·00	+ 1·21	·60	10*a*	15	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	3·85	+ 1·34	·75	9	21	67·0	12	37·1	26	0	...
XVII.		Braemar	4·01	+ 1·15	·76	27	21	63·2	4	31·0	21	1	7
,,		Aberdeen (Cranford)	4·33	...	·75	22	26	63·0	14*b*	32·0	27	1	...
XVIII		Strathconan [Beauly]	6·57	+ 2·89	1·08	23	17	...	...	...	...	...	...
,,		Glencarron Lodge.....	7·76	...	·93	17	20	69·8	12	34·0	27	0	...
,,		Cawdor	3·94	+ 1·19	·77	27	24	...	...	...	...	...	...
XIX.		Dunrobin	4·67	+ 2·08	·77	22	21	62·0	3	38·0	26	0	...
,,		S. Ronaldsay (Roeberry).....	4·73	+ 2·07	·90	17	23	61·0	3	39·0	25	0	...
XX.	IRELAND.	Darrynane Abbey.....	5·81	...	·74	24	25	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	6·12	+ 3·20	·96	24	21	68·5	10	36·0	3	0	...
,,		O'Briensbridge (Ross)	7·23	...	·94	24	24	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	5·93	+ 3·11	·93	24	24	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	5·07	+ 3·10	·95	4	23	68·4	17	41·1	21	0	0
XXII.		Ballinasloe	5·73	+ 2·94	1·03	24	25	64·0	4, 6	34·0	21*e*	0	...
,,		Clifden (Kylemore)	9·15	...	1·85	24	24	...	...	...	...	...	...
XXIII		Waringstown	4·98	+ 1·82	·95	24	26	71·0	12	35·0	20	0	1
,,		Londonderry (Creggan Res.).	5·19	+ 1·41	·81	26	24	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·89	+ 1·51	·86	24	26	68·0	10*c*	35·0	20	0	0

+Shows that the fall was above the average ; —that it was below it.

a—and 15. *b*—and 15, 17. *c*—and 12. *d*—and 30. *e*—and 30.

METEOROLOGICAL NOTES ON SEPTEMBER, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

LONDON, CAMDEN SQUARE.—During the 38 years over which observations extend, no other September had so large a rainfall, the greatest being 5·28 in. in 1871. It is the wettest month since October, 1880, and in the 38 years there have been only five wetter months.

HITCHIN.—Only four wetter months since this record began in 1849; in the first 14 days 4·24 in. fell.

ADDINGTON.—The greatest rainfall ever recorded here in September. On the 25th a great gale did much damage to the apple crop. On the 8th a very heavy TS commenced about 10 p.m., the L being particularly vivid, and one clap of T unusually heavy.

BURY ST. EDMUNDS, WESTLEY.—The wettest month since the register began in 1857, more than 5·00 in. having been recorded in only 8 months during that time. T on 1st; distant T on 11th, 12th, 13th and 20th; TSS on 9th, 10th and 28th.

NORWICH, BRUNDALL.—A rough, rainy month, the wettest September since 1885; R ·97 in. above the average, but the total for the year still 3·55 in. deficient. On 10th ·22 in. of rain fell in 10 minutes. L on 9th, 13th, 19th and 24th; T on 1st, 9th and 13th; H on 13th and 20th; strong gales on 23rd and 25th.

WEYMOUTH, LANGTON HERRING.—By far the wettest September in the last 22 years; the next wettest were 1876 5·50 in., and 1883 4·52 in. The rainfall for September exceeded the aggregate of the five preceding months by 2·27 in. The total for the 9 months is 81 per cent. of the average. Mean 9 a.m. temp. 57°·6, or 0°·4 below the average of 24 years. Solar halo on the 24th, followed by a great gale on the night of the 24th and 25th, which uprooted many trees. TS on the 8th.

TORQUAY, CARY GREEN.—Rainfall 3·22 in. above the average; the fall of 9 months, January to September, being 8·42 in. below the average. Mean temp. 57°·9 or 0°·1 below the average. Duration of sunshine 105 hours, being 59 hours 25 minutes below the average. Two sunless days.

POLAPIT TAMAR [LAUNCESTON].—An exceptionally wet month, in marked contrast to September, 1895, both as regards R and temp. The last 10 days were generally very wild and stormy. The R on the 8th (1·43 in.) has been exceeded only on five occasions during the past 16 years. N.W. gale on 25th; foggy on 26th.

STROUD, UPFIELD.—TS at night on 7th; S.W. gales on 17th and 22nd; severe N.W. gale on 25th; trees blown down.

WOOLSTASTON.—A wet month, there being only four days on which no R fell. Violent storm of T and L with very large H on the 12th. The church here was slightly struck, and several pieces of stone chipped off the font. Heavy gale on the 24th, with wild and stormy weather for some days. Mean temp. 54°·5.

TENBURY, ORLETON.—A cold, wet month, with a rainfall considerably in excess of the average, and the largest amount in September since 1883. Although the days were cold and there was very little sunshine the mean temp. of the month is 1°·3 above the average of 35 years. L on the 8th, and T on the 9th and 20th.

LEICESTER, BARKBY.—R fell on the last two days of August, and on 29 out of 30 days in September. Mean temp. 55°·1. Water in Leicester still slightly

restricted, the late gain being used for storage. The first five months of the year gave 5·16 in. of rain, the last four months 12·32 in. L and T on 8th, 9th, 12th and 20th, and T on 10th.

MANCHESTER, PLYMOUTH GROVE.—The wettest September since observations commenced in 1868, with the exception of September, 1869, when 5·67 in. fell, and 1872 6·79 in. Mean temp. 57°·5.

WALES.

HAVERFORDWEST.—The wettest and most stormy September since 1883, which proved disastrous to the late hay crops and the cereals on the high lands; root crops very much benefited by the R. Gales of exceptional violence on the 21st, and 24th–25th, the latter doing considerable damage to roofs and buildings. On the whole a very equable month as regards temperature.

ABERYSTWITH, GOGERDDAN.—Stormy throughout, and a very strong gale on 25th and 26th.

SCOTLAND.

CARGEN [DUMFRIES].—Exceptionally heavy R and absence of sunshine made this one of the dreariest and dullest Septembers ever experienced. Heavier rainfall was recorded in 1885 (7·30 in.), and 1869 (8·20 in.), but never has so little been seen of the sun; the hours of sunshine being less than half the average. The mean bar. pressure has not been lower since 1869. In the 16 days 14th to 29th, the R on 14 exceeded ·10 in. For the nine months of the year the total is 2·19 in. below the average. A severe gale from S. occurred early on 27th, and T and L on 12th, 15th, 19th and 27th. As a consequence of the unfavourable weather, little progress was made with harvest, and considerable damage has been done to the corn still outstanding.

JEDBURGH.—The rainfall is remarkable for quantity and persistence during the month. This retarded the ingathering of cereal crops very much, and to a certain extent caused damage, not, however, to any grave extent. The turnip crop is very good, and grass lands are in fine condition.

COLMONELL.—Rainfall ·91 in. above the average of 20 years. Mean temp. 55°·4 or 2°·0 above the average.

MULL, QUINISH.—Very fine weather from 1st to 13th, thence to the end of the month a succession of gales from all quarters, with T and H on 15th and 16th.

BRAEMAR.—A cold, bleak and disagreeable month. Sunshine 76 hours 20 minutes only.

ABERDEEN, CRANFORD.—Little sunshine during the month, and much fog in the first fortnight. Bad harvest weather.

S. RONALDSAY, ROEBERRY.—A very wet unsettled month. Mean temp. 50°·4, 1°·4 below the average of six years.

IRELAND.

DARRYNANE ABBEY.—A very wet month, and the second half very wild and stormy.

WATERFORD. BROOK LODGE.—Dense fog on 3rd. T on 9th and 12th, L on 11th and 12th. Heavy gale on 22nd, and gales on 25th and 27th.

O'BRIENSBRIDGE, ROSS.—A very bad harvest month and much injury to crops. Very violent gale for three hours on 24th.

DUBLIN.—Unlike the Septembers of 1893, 1894, and 1895, all of which were fine and summer like, this month was unsettled, stormy, and excessively wet throughout. The mean temp. 55°·8 is exactly equal to the average; the mean atmospheric pressure was however largely in defect. The rainfall is the greatest on record, being more than double the average. High winds were noted on 15 days, and attained the force of a gale on 14th, 16th, 17th, 22nd, 23rd 25th and 27th. L on the 9th, 10th, 12th and 27th. Foggy on the 4th and 9th; H on 19th; lunar halo on 16th, solar halo on 18th.

WARINGSTOWN.—The R of September, 1896, has only once been equalled since the record commenced in 1861, viz., in 1882, when exactly the same amount fell in September as this year; but it fell on 18 days instead of 26, and consequently was not so detrimental to the harvest. Much of the oat crop is still out, and some of it seriously damaged.

OMAGH, EDENFEL.—Although the rainfall of September, 1896, has been exceeded three times in the 32 years recorded here, viz., 1872, 1879 and 1885, it is doubtful if in any of those years the fall was more persistent or the atmospheric conditions more disturbed; the wind, temperature, and pressure daily undergoing sudden and sometimes violent changes. The damage done to the crops has been accordingly very serious, and exceeds that of the above years in proportion to this year's more abundant promise.

TORNADO IN PARIS.

ABOUT 3 p.m. on September 10th, a tornado passed over Paris. It began at the Place St. Sulpice and ended at the Boulevard de la Villette, a distance of nearly two miles. The apparatus at the Meteorological Bureau and the Eiffel Tower were not affected by it, as they are not within that area. M. Angot, head of the Meteorological Bureau, was at the Pont Royal, about to take a boat, when he noticed small dark clouds, very low down, apparently moving against the wind, which was not at all high, the velocity not being more than five or six yards a second. He soon perceived that the clouds had a rapid circular motion, not horizontal, but oblique. He believes that the tornado, when he first observed it, was a mile distant, and that its diameter was about 170 yards.

The meteorologist at the Tour St. Jacques states that the storm lasted less than a minute. Some black clouds passed swiftly overhead and there was one flash of lightning. The barometer suddenly fell from 748mm. to 742mm., but immediately rose again. An omnibus was overturned on the Pont au Change and another in the Place du Châtelet, and in the Rue de Harlay a cab was thrown over and the driver killed. Stalls in the flower market in the Place St. Sulpice were carried away, and an omnibus driver was blown from his seat and broke his leg. One side of the Palais de Justice had its windows broken and part of the roof blown off. The roofs of the Opéra Comique, the Châtelet, and the Tribunal of Commerce, were damaged, and the Prefecture of Police had two heavy doors wrenched off, and a sentry box carried some distance away. Kiosks and shop fronts were shattered and tables and chairs outside cafés were carried away. In addition there is the usual list of trees torn up, and chimneys overthrown. Seven persons were killed and many seriously injured, several of whom were not expected to recover

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXX.] NOVEMBER, 1896. [PRICE FOURPENCE, *or 5s. per ann. post free.*

THE CLIMATE OF THE BRITISH EMPIRE IN 1895.

OUR annual climatological table for 1895 presents one unusual feature. The highest shade temp. was recorded at an East Indian station, the 107°·2 at Calcutta being apparently the highest reading there in the past 15 years, while Adelaide, which usually heads the list, recorded a maximum well below the normal.

The other extremes set out in the summary, fall so regularly to certain stations that they call for little comment. For extreme cold and range of temperature, Winnipeg is unapproachable, while year after year Ceylon shows the smallest total range, the highest mean temp. and the greatest rainfall. Malta, again, one is quite prepared to see with the smallest rainfall. The greatest and least amounts of cloud, perhaps, fall less regularly to any given station than the other elements; but Esquimalt and Bombay have frequently appeared for the two extremes. Jamaica, on the other hand, appears for the first time. Adelaide, usually prominent in the summary of extremes, this year retains its place only as the driest station.

Summary.

Highest Temp. in Shade ...	107°·2 at Calcutta, on May 20th.
Lowest „ „ ...	—45°·5 at Winnipeg, on Feb. 5th.
Greatest Range in Year ...	133°·8 at Winnipeg.
Least „ „ ...	26°·9 at Colombo, Ceylon.
Greatest Mean Daily Range	23°·0 at Winnipeg.
Least „ „ „ ...	10°·3 at Mauritius.
Highest Mean Temp.	81°·7 at Colombo, Ceylon.
Lowest „ „	34°·5 at Winnipeg.
Driest Station	Adelaide, mean humidity 59.
Dampest Station	Esquimalt, „ „ 89.
Highest Temp. in Sun	178°·0 at Trinidad.
Lowest Temp. on Grass ...	—27°·0 at Toronto.*
Greatest Rainfall	92·23 in. at Colombo, Ceylon.
Least „	11·38 in. at Malta.
Most Cloudy Station.....	Esquimalt, average amount 6·6.
Least „ Stations	Bombay and Jamaica, aver. amount 3·9.

* The min. on grass is not recorded at Winnipeg.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE FOR 1895.

Stations. *Those in Italics are South of the Equator.*	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Mean.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Average. Cloud.
	°		°		°	°	°	°		°	°	in.		0—10
England, London ...	86·2	May 30	7·3	February 8	57·9	41·8	49·9	41·8	78	135·3	5·0	21·47	137	5·8
Malta	103·6	July 5	34·2	February 19	73·5	59·6	66·5	56·9	75	159·0	31·7	11·38	67	4·5
Mauritius	89·5	February 18	54·8	June 22	79·6	69·3	74·5	65·3	76	137·3	45·6	54·16	196	5·7
Calcutta	107·2	May 20	47·4	December 25	86·7	70·3	78·5	68·6	74	160·5	38·0	39·38	74	4·1
Bombay	93·8	June 7	60·8	January 23	85·8	74·9	80·4	71·5	75	144·5	49·8	67·59	109	3·9
Ceylon, Colombo ...	93·7	May 1	66·8	January 31	87·7	75·6	81·7	71·7	77	157·0	55·0	92·23	201	5·4
Melbourne	100·6	February 13	29·5	June 17	68·2	49·6	58·9	47·7	69	155·9	20·4	17·06	131	5·2
Adelaide.....	105·4	Feb. 12, 13	36·9	May 26	73·0	53·5	63·3	48·1	59	174·0	29·6	21·27	130	4·7
Sydney	96·1	December 15	36·8	July 9	69·8	56·3	63·1	54·1	73	157·2	24·6	31·89	173	4·6
Wellington.....	88·0	February 20	32·0	July 13, 26	61·2	49·1	55·1	46·3	72	145·0	20·0	61·49	176	4·8
Auckland	85·0	February 18	37·0	July 21 / August 3	64·6	52·5	58·5	49·7	73	145·0	32·0	44·15	203	5·3
Jamaica, Kingston..	94·6	August 17	62·8	December 21	87·5	71·1	79·3	68·9	76	...	...	20·89	78	3·9
Trinidad.....	95·0	May 11	63·0	Feb. 5, 25	87·9	69·6	78·7	70·4	76	178·0	62·0	62·23	178	..
Toronto	93·4	May 30	—21·2	February 6	52·9	35·6	44·2	36·9	75	109·5	—27·0	28·04	161	5·7
Manitoba Winnipeg	88·3	August 15	—45·5	February 5	46·0	23·0	34·5	..	...	...	...	18·42	148	5·9
British Columbia, Esquimalt	82·0	May 16	20·1	November 5	55·4	41·6	48·5	44·1	89	...	...	32·40	188	6·6

THE SCIENTIFIC USE OF KITES.

IN February, 1895, we gave in these pages some particulars respecting Mr. Rotch's efforts to obtain records of temperature, &c., at great heights by means of kites, and quoted some of the results which had been obtained at the Blue Hill Observatory in July and August, 1894.

In the *Met. Mag.* for August, 1896, Mr. Rotch pointed out that the credit of priority in this field of work belonged to a Scotchman, Dr. Wilson, who had used tandem kites in 1749.

The following paragraph shows how extremely successful Mr. Rotch's staff at Blue Hill have been :—

> The observers at the Blue Hill Observatory, near Boston, Mass., report that a 3lb. meteorograph, made by Richard, of Paris, was raised by them by means of 2⅛ miles of piano wire, on July 20th, to a height of 5,961 ft. above the hill, thus breaking all kite-altitude-records Three Eddy kites, made by Fergusson, passed through and beyond the clouds, and were only visible at intervals between breaks in the clouds. The kites and instruments remained at the highest point half-an-hour, and exerted a pull of from 110 to 120lb. The meteorograph showed that the air was very dry above the clouds, and about 18° colder than at the earth's surface.

But this was far surpassed on October 8th, of which the following is the account in the *New York Advertiser*:

> William A. Eddy, of Bayonne, N. J., has received from the observers at the Blue Hill Observatory, near Boston, the definite particulars of the extremely successful kite flying test which they made on October 8th.
>
> The ascension was to an altitude never before reached. The operators sent their meteorograph to the height of 9,385 ft. More than three miles of piano wire was paid out, the ascension beginning at 9.5 in the morning and ending at 9.15 in the evening. When the highest point was reached, the pull on the wire was from fifty to ninety-five pounds.
>
> The instrument entered and passed through the clouds as shown by the record of a very dry air above the clouds. The temperature fell from 46 degrees on the hill to 20 degrees at an altitude of 8,750 ft. The meteorograph record, in ink, on a revolving cylinder run by clockwork, was the best and clearest yet obtained. The recording apparatus was more than a mile high during three hours.

The Americans are now giving great attention to the subject, and Prof. Willis Moore, the Chief of the Weather Bureau, has detailed Prof. Marvin and other members of his staff for study of this branch of meteorological research. With the ample resources of the U.S. Weather Bureau, remarkable developments may reasonably be expected, and we certainly wish the Bureau every success. The

Monthly Weather Review (which, under Prof. Cleveland Abbe's able editorship is becoming a sort of American Meteorological Magazine) has recently contained a series of articles by Prof. Marvin on the History, and Theory of the Meteorological use of Kites, with reference especially to their form and construction. We understand that besides the experiments at Washington, the Weather Bureau is having others made in California, Montana, and Michigan.

It may merely betray our own ignorance, but there is one point on which we have seen no statement. A kite can go up only when there is wind, a balloon can go up in a calm; a kite cannot carry as much weight as a balloon. Why are kites better than captive balloons?

The last (July) number of the *Monthly Weather Review* gives the following interesting report from the far North-West—just E. of the Rocky Mountains:—

KITES IN MONTANA.

By Mr. A. B. Coe.

From the recent letters received from Mr. R. M. Crawford, director of the Montana section of the Climate and Crop Service, and from Mr. A. B. Coe, voluntary observer at Kipp, Montana (N. 48° 45′, W. 112° 45′, elevation about 4,000 ft.), we take the following notes, and hope that others may be led to pursue similar studies with the same enthusiasm. Mr. Coe says:

I herewith transmit an account of a little experiment tried recently, employing a cellular kite of the dimensions described in the November, 1895, *Weather Review* for the purpose, and my maximum thermometer.

A phase of our climate at this station is the frequent veering of the wind from westerly points to north or north-east, accompanied by an extremely rapid fall of temperature, and usually more or less precipitation.

I have often thought that these cold waves did not reach very high up, and that at no great height above them the warm south-west wind still prevailed. For several days prior to July 19th, 1896, my maximum had been climbing up into the nineties too frequently for comfort. The air was dense with smoke, when the wind suddenly veered to the north-east, blowing steadily at about 15 or 20 miles an hour, and pretty thoroughly clearing the atmosphere of smoke. The temperature fell 51° in the next twenty-four hours, and on the 21st the clouds were dragging on the ground, and precipitating both rain and snow. At 11.30 a.m., on that date, my minimum thermometer registered 32°, but only for about twenty minutes, when it rose to 38°. From occasional glimpses of the sun obtained through breaks in the clouds, and from its red appearance, it was evident that there was another current of air full of smoke at a low altitude, blowing from the west, and undisturbed by the cold wave from the north-east beneath it.

The time and circumstances seemed propitious to test my theory, so I climbed to the top of a hill near my home, which I found by triangulation to be about 200 ft. above my usual place of observation. Thither I bore my tailless kite, maximum thermometer, and 4,800 ft. of No. 24 twine, tagged at every 100 ft. for convenience in computing elevation. I secured the thermometer firmly in a pasteboard tube, open at both ends, and fastened this to my kite with wire. At 1.15 p.m. the surface temperature was 38°, when with the help of an assistant I soon had both kite and instrument mounting steadily upward on a flight of exploration.

I will have to add right here that my kite is a "stayer," and the only one of any description I ever made that would fly. I let it run out 1,000 ft., and on drawing it in found there was no difference in its registration. Again I let it out, and it was not until 3,900 ft. of twine had unreeled that any change in its action was observed; then I noticed that the kite above the fog and clouds was pulling nearly north-east, instead of south west, as at first. Upon pulling it in, during which operation it again assumed its strain to the south-west, I was overjoyed to discover that the register stood at 77°, while at the point where I stood it remained at 39°. Being anxious to make sure that there was no mistake, I sent the instrument up again, and obtained a like result at about the same altitude, the kite going through the same movements as at first; but whether my observation is of any value aside from the personal satisfaction derived, is a question.

I anticipate some interesting experiments this coming winter in this direction, to determine, if possible, at what elevation the warm winds locally termed "chinooks" blow, at times when their influence is felt many miles east of this point, while remaining intensely cold here.

In response to a request for further data as to the protection of his thermometer and other matters. Mr. Coe writes:

I employed a strong pasteboard tube 12 in. in length, and $1\frac{3}{4}$ in. in diameter for the purpose. In this I sewed my maximum thermometer securely with strong pack thread, and packed fine cotton around each end for the better protection of the tube. Directly over the tube I cut a slit $\frac{1}{4}$ by 8 in., so that the scale could be readily seen without removing the instrument. Four feet from the belly-band I secured the tube to the twine with fine wire. The wind was blowing a good stiff breeze at the time, probably 20 miles an hour, and from the time the kite was let go until pulled in 23 and 25 minutes, respectively, elapsed, and the difference in temperature at each trial was the same as stated. My kite rose and descended very steadily without diving or pitching, so that I could not well believe that the difference in temperature was caused by any condition other than an upper current of warm air, blowing from the south-west at that altitude. The clouds near the earth were very dense, while from another experiment tried at the same time, I am satisfied that the kite passed through the clouds into bright sunshine. I secured a strip of sensitized paper between two thin pieces of mica, and sent it up attached to the kite, and exposed a similar piece to the light on the ground, in a like manner to protect the paper from dampness. While the paper at my feet remained unchanged in colour to any extent the piece sent up was changed to a bronze black.

ESCHUID-ASHINDON.

To the Editor of the Meteorological Magazine.

SIR,—In reply to Dr. Hellmann, the following is extracted from "Memorials of Merton College," (Oxford Historical Society) by the Hon. G. C. Brodrick, Warden (p. 200).

"John Ashindon or Ashinden, also called Eastwood (1338), according to Anthony Wood was the greatest mathematician and astronomer ever produced by Merton College, as well as an eminent physician. In these researches he was aided by his brother Fellow, William Rede, and published treatises in concert with him, besides several under his own name. His works are cited with great respect by Pico de Mirandola. Anthony Wood dates from him a succession of mathematical and astronomical students at Merton, extending over at least a hundred and fifty years after his time. But he (Anthony Wood) adds that nearly all their works disappeared from the College library—probably together with many hundred volumes of school divinity—during the visitation in the early part of Edward VI.'s reign, when such books relating to natural science, being regarded as profane, if not diabolical, were burned, or sold as waste paper. Not less than a cartload of valuable MSS. are said to have been thus abstracted from Merton College Library. This statement Anthony Wood makes on the authority of Thomas Allen, 'the famous mathematician of Gloucester Hall,' in the reign of Queen Elizabeth, whose evidence was reported to Wood himself by John Wilton, Chaplain of Merton."

Yours truly,

C. E. PEEK.

Rousdon Observatory, Devon.

To the Editor of the Meteorological Magazine.

SIR,—In reply to Dr. Hellmann's letter, *re* Eschuid, in the *Met. Mag.* of September, may I refer him to *Notes and Queries* of November 23rd and December 7th, 1895, pp. 409, 452; January 18th, February 22nd and March 14th, 1896, pp. 52, 152, 218; July 25th, 1896, p. 83?

Yours truly,

FRED. COVENTRY.

Duddington, Stamford, Sept. 24th, 1896.

ISOBARS.

To the Editor of the Meteorological Magazine.

SIR,—I have found an earlier use of the word Isobar: *H. K. W. Berghaus* in 1838. In the text accomanying his Physical Atlas (p. 63) he calls isobars (Isobaren) the lines of mean equal atmospheric pressure at the level of the sea.

The isobarometric lines which Mr. J. Lardner Green mentions in

the magazine, p. 138, are not lines of equal pressure, but lines of mean equal oscillation of the barometer first drawn by L. F. Kämtz, in 1832 (*Lehrbuch der Meteorologie* Band II., s 339, and pl. III.). Kämtz remarks in a foot-note that *the* name adopted by him is not quite right, as isobarometric lines indicate properly lines of equal pressure, but he excuses himself with a sentence from A. Kircher, "in verbis simus faciles." Just for this reason Berghaus adopted the new word isobars for lines of mean equal pressure, which at that time were still supposed to run parallel to the equator, although G. A. Erman had previously (in 1831) pointed out that the mean atmospheric pressure varies not only with the latitude but also with the longitude (Poggendorff's Annal. XXIII., 144).

G. HELLMANN.

Berlin, October 18th, 1896.

METEOROLOGICAL OBSERVATIONS IN SCHOOLS.

Prepared for the Connecticut State Board of Education by ROBERT DE C. WARD, Instructor in Meteorology in Harvard University.

THE time has come when meteorology should be systematically taught in our schools. It is a subject of the greatest practical interest and importance. It lends itself very readily to teaching. It trains those who study it, in habits of scientific thought and investigation, Already in many of our grammar and high schools some meteorological instruction is given, and the keeping of meteorological records by scholars is every year becoming more general. As yet, however, there is no *system* in all this work, and, in consequence, much that is being done is wasted effort, without definite result. The present circular is designed to indicate some of the lines along which the elementary study of meteorology should proceed in order to be most thorough and most useful.

The children themselves, even in the earliest primary school years, take the first step towards an understanding of our ordinary weather changes. They unconsciously notice whether a day is fair or rainy, hot or cold, a pleasant one on which to be out, or one on which they would rather stay indoors. These facts are temporarily impressed upon their minds when they start for school; when recess time comes; and when they go home. If it is raining or snowing, they need umbrellas and rubbers [goloshes]; if it is cold, they need overcoats; if it is windy, they find it hard to walk; if it is icy, they can enjoy themselves sliding on the ice; if there is soft snow on the ground they can make snowballs; if it is very hot, they prefer to walk in the shade. We are all so directly affected by the weather conditions prevailing at any moment, that even the youngest school children are forced (unconsciously, to be sure) to take some notice of these conditions. Here lies the first work of the teacher who wishes to teach her scholars something rational as to the simpler facts of meteorology.

The first step is to make the children intelligent observers of

weather changes and conditions, instead of leaving them merely blind, unconscious subjects, as they otherwise are. This introductory work on the part of the teacher is simple, and, if entered upon with enthusiasm, becomes very helpful to both teacher and scholars. It may be briefly sketched as follows: When the children come to school on some snowy winter day, with a violent north-east wind, chilling and damp, attention may be called to the need of overshoes and overcoats; to the fact that the snow should be shaken off the clothing in order to prevent the latter from becoming wet; to the piling up of the snow in deep drifts at certain places near the school or in the town, while in other places the ground is left bare; to the ease with which snowballs may be made, and to other facts which will very readily suggest themselves. A day or two after such a storm, when the sun is shining brightly in a cloudless sky; when there is no wind and the air is dry, cold, and crisp, the contrasts between these two weather types should be brought out. Instead of snow we now have sunshine; instead of a damp, chilling north-easter we now have a calm, and the air is dry; snowballs cannot easily be made in the early morning, because the snow is frozen hard and is too dry, but towards noon, if the temperature rises high enough, there may be thawing on the tops or sides of the snow-drifts, and there the snow becomes soft enough for snow-balling. Another weather type, often noted during our New England winter and strongly contrasted with both of the preceding conditions, is that which brings us a warm, damp, southerly wind, frequently accompanied by heavy rains. As these damp winds blow over snow-covered surfaces they become foggy and the ground is said to "smoke;" the heavy rain rapidly melts the snow; slush and mud make bad walking; rivers and brooks rise rapidly, perhaps overflowing their banks; low-lying places become filled with standing water. These and other features should all be brought out by the teacher, not by telling the children of them directly, but by judicious questioning, and they should be contrasted with the conditions which may immediately follow, when the storm has cleared off, and when the low temperatures brought by a "cold wave," with its dry north-west wind, have resulted in freezing lakes, rivers, and brooks; when skating and sliding may be indulged in, and when hot fires are a necessity.

Early summer weather conditions, with their accompanying warm spells, thunder storms, and sea breezes, furnish another long list of typical changes that should be just as carefully noticed and described as the more striking winter characteristics—in fact, these examples might be extended indefinitely. Enough has, however, been said to indicate the lines along which this preliminary training of the children should proceed. The central idea should be to train the scholars in intelligent weather observation, so that they may come to appreciate what our typical weather changes are; that they may recognize the types as they recur over and over again, and may see

how each example differs from, or accords with, those that have preceded it. In this way, by spending only a few minutes a day on the subject, the teacher may soon bring her children to the point of being intelligent, rational observers, and by the end of the primary school years they should have in mind, not only our typical weather changes, but the larger facts of seasonal change as well.

This simple method of getting an appreciation of our seasonal and daily weather types is a very important step towards a rational understanding of the larger facts of meteorology. It should, in all cases, precede the next step—observations with instruments.

In the instrumental work, which may usually be begun in the early years of the grammar school course, it is not well to attempt anything more than records of temperature, wind direction and velocity, and rain and snowfall. Current observations without the use of instruments should, however, be made in addition, such observations including the state of the sky (clear, fair, cloudy); the kind of precipitation (rain or snow), &c., together with any other notes as to peculiar features which may happen to be noticed day by day.

Temperatures are of course registered by thermometers. For school use a good mercurial thermometer, costing $2 or $3 (say 10s.), should, if possible, be purchased.*

Ordinary thermometers, costing 50 cents or $1 [2s. to 4s], are inaccurate, and records from them are of little value. The thermometer ought to be hung away from any building, in the shade, about four feet above a grass-covered surface, but as this is in most cases impossible or impracticable, it does sufficiently well for general purposes if the instrument is fastened outside a north window, at least 1 ft. away from it, and so arranged that it can be read from inside without opening the window. If possible, a window should be selected which is seldom opened.

Wind directions may be taken from the indications of a neighbouring vane, but care should be taken to see that the vane is in good working order. Wind velocities may be roughly estimated as, calm; light; moderate; strong; gale.

Rain may be measured by means of an ordinary lard pail, or even a tomato can with the top cut off evenly and sharply. This should be set in an open space, away from trees and buildings, and ought to be so arranged that it can be fastened to a short stake to prevent its blowing over. The depth of water in the can may be measured, roughly, with a foot rule, divided into inches, quarters, and eighths. In the case of snowfall, which is difficult to measure satisfactorily, the best way is to select some flat space where the snow has not drifted and then to press the inverted can down on the snow, thus cutting out a circular section of snow. By means of a thin board,

* A mounted mercurial thermometer, of the Weather Bureau pattern, can be purchased from Julien P. Friez, 107, East German Street, Baltimore, Md., for $3 [12s.]

or a shovel pushed under the can, the snow inside the can is retained, and the can with its contents may be taken indoors. There the snow should be melted and the depth of water it produces measured.

These are, of course, very simple and very crude observations, but they are all that can be attempted in most schools, and are certainly all that can well be attempted at the start in any case. If the older scholars are especially interested, the instruments may easily be added to. Maximum and minimum, and wet and dry bulb thermometers; a standard rain-gauge, a barometer, &c., may be secured, and much fuller records kept, but these additional instruments are somewhat expensive, and their care and observation require much time.

Now, when should these simple records be made, and how should they be preserved? The answer to these questions ought to be left to the scholars themselves to work out. They will probably begin by thinking one observation a day quite sufficient, and they will perhaps prefer to take this in the morning, before school opens. It is a good plan to have a different scholar assigned to the duty of taking the observations every day, the better scholars being given this piece of work as a sort of reward, and it is also advisable to have the daily weather record written upon the blackboard so that all can see it. The teacher should lead the scholars to see that only one observation of the temperature a day does not serve to give a fair average for that day. The temperature usually rises towards noon, and a reading of the thermometer made at 8.30 or 9 a.m. is often much too low for the actual temperatures experienced in the early afternoon. In this way, by judicious questioning and suggestions, the children will soon come to see the need of several observations of the temperature, the wind direction and velocity, the state of the sky, &c., and in time it may be so arranged that an observation can be taken every hour during school days. One reading of the rain gauge a day will, however, usually be sufficient.

At the end of each day the blackboard data should be entered in a permanent record book by some one of the scholars, and some ingenuity can be exercised in devising the best scheme for keeping this record. The record book should be carefully preserved in the schoolroom, where it may be referred to by the scholars of future years when any unusually severe storm, or a spell of excessively hot or dry weather, or a remarkable "cold wave" occurs, in order that comparison with past occurrences of a similar kind may be made. The keeping of such a record-book teaches the children neatness and punctuality; the adding up of the monthly and weekly temperatures and rainfall, trains them in simple arithmetical work; the taking of the observations gives them a feeling of responsibility which makes them accurate and attentive.

Just as the children have, in their earlier, non-instrumental observations, become familiar with the typical weather changes, so they now have their eyes opened to the discovery of other new facts

unknown before. Among these discoveries, which the brighter children will soon make, are the following: The temperature noted during the day, especially during the summer half-year, is prevailingly higher about noon, and in the early afternoon, than in the morning or at night. This, of course, is seen to depend on the sun, and thus the marked control of the sun over our temperature distribution is brought out. In winter this simple diurnal temperature distribution is very often entirely obliterated by the conditions brought about by the passage of storms, which come at irregular intervals, and whose warm and cold winds control our winter temperatures to a great extent. This winter storm control of our weather and temperature, as distinguished from the solar control so characteristic of summer, is one of the marked features of our climate. The relation of certain directions of the wind to certain kinds of weather conditions is soon noted, and in this way a set of simple rules for local weather prediction may be framed. The increase of wind velocity towards noon in summer, with calms in the early morning and at night, cannot fail to be detected by the brighter children.

The diurnal growth of clouds, too, with a maximum cloudiness in the early afternoon and clear sky at night, often noted in summer, must soon appear as a characteristic feature of our spring and summer weather conditions. On clear, calm winter days, temperature readings made in the morning and evening from thermometers at some distance above the ground, as out of a second or third-storey window, or exposed on hills or rising ground, will be found to be higher than the readings made where the thermometers are near the ground, or in valley bottoms. The occurrence of rain and snow at *any* time of day in winter, while in summer our precipitation comes chiefly in the afternoon and evening, from thunderstorms, will soon be noted, both on examining the record, and as a result of individual observation.

These, and very many other facts, may and will be discovered by children who are taught along the lines which have here been indicated. Such work cannot fail to attract both teacher and scholars. It adds to the interest of life; it gives admirable training in simple scientific investigation and habits of thought; it results in making the children more careful, more punctual, and neater in their other work; and it lays a foundation on which, in after years, a more advanced study of meteorology may be built up.

Systematic work on the practical use of the daily weather maps, as outlined in the Report of the Committee of Ten on Secondary School Studies, should follow the simpler elementary exercises suggested in this pamphlet; and it is hoped to indicate, in a later publication, the lines along which this more advanced study should proceed.

ROBERT De C. WARD.

Harvard University, Cambridge, Mass., March 14th, 1896.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MAY, 1896.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	78·9	29	36·1	4	67·2	45·2	43·4	66	122·9	25·6	·14	3	4·4
Malta	77·5	22	52·3	14	69·7	57·0	55·2	78	129 7	44·8	1·02	7	6·1
Mauritius	79·3	18	62·2	22	77·0	69·1	65·4	79	128·3	53·0	13·55	17	6·4
Calcutta	99·3	23	70·4	8	94·5	77·6	75·2	71	156·0	68·9	4·35	6	4·4
Bombay	93·3	31	79·3	29	91·5	82·1	76·8	73	142·3	72·3	·26	2	2·9
Ceylon, Colombo	92·2	9	70·1	4	89·0	79·1	74·7	78	160·0	63·0	9·31	15	5·9
Melbourne	72·1	1	38·5	8	59·9	47·0	54·0	77	119·9	28 8	2·62	10	6·8
Adelaide	73·7	2	41·5	25	64·5	48·5	46·7	70	130·8	32·1	1·47	14	5·4
Sydney	81·0	3	45·2	13	65·5	52·6	49·8	86	129·7	37·9	3·84	15	4·2
Wellington	65·0	14	38·0	20*b*	59·1	47·1	45·0	74	118·0	24·0	3·03	14	4·3
Auckland	69·0	4	43·0	11	62·5	51·7	48·2	72	106·8	38·0	3·63	18	6·0
Jamaica, Kingston	90·7	15	70·0	1, 3	86·6	72·4	69·9	78	...	...	4·34	9	5·7
Trinidad	94·0	19*a*	69·0	11*c*	91·1	72·0	72·1	76	171·0	67·0	1·62	8	...
Grenada	84·6	3	71·0	16*d*	82·7	74·0	71·6	79	150·2	...	10·16	21	5·1
Toronto	90·8	9	36·5	20	71·1	49·2	48·2	66	105·0	29·0	2·44	10	5·0
New Brunswick, Fredericton	80·2	10	26·0	1	64·7	37·4	37·5	56	...	...	·88	5	4·0
Manitoba, Winnipeg	85·0	6	32·0	2	65·7	44·5	...	...	...	...	5·32	17	7·0
British Columbia, Esquimalt	65·2	29	35·3	15	58·6	43·4	43·6	84	...	...	1·62	18	7·0

a—and 20. *b*—and 21. *c*—and 19. *d*—and 23.

REMARKS.

MALTA.—Adopted mean temp. 62°·1, or 2°·2 below the average. Mean hourly velocity of wind 10·8 miles. Average temp of sea 63°·2. TS on 12th, L on 23rd. Absolute max. and average max. in shade the lowest for May in 13 years. Number of rainy days and the mean amount of cloud the highest recorded for May. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·1 below, of dew point 1°·0 above, and rainfall 9·11 in. above, their respective averages. Mean hourly velocity of wind 11·3 miles or 1·2 mile above the average; extremes, 25·4 on 7th, and 2·1 on 20th; prevailing direction, E.S.E. T and L on 7th, and L on 18th. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms occurred on 7 days. D. G. MANTELL.

Adelaide.—Mean temp. 1°·1 below the average of 39 years. Rainfall 1·42 in. below the average. C. TODD, F.R.S.

Sydney.—Rainfall 1·24 in. below, and humidity 10·8 above, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Fine up to the 4th, then showery to 7th, heavy R on 8th and 14th, but otherwise generally fine for the remainder of the month, with only light rain at times. Prevailing winds N.W., strong on four days; fog on 14th. Temperature 1°·1 above, and rainfall 1·96 in. below, their respective averages. R. B. GORE.

Auckland.—A showery month, but with no heavy falls of R. Violent N.E. gale on 13th and 14th. Mean temp. almost exactly the average, rainfall slightly below. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 3·4 miles. Rainfall in Kingston one-fifth less than the average, but the mean for the Island shows a fall of about the average. R. JOHNSTONE.

TRINIDAD.—Rainfall 2·03 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, OCTOBER, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	4·17	XI.	Lake Vyrnwy	6·09
,,	Birchington, Thor	5·32	,,	Corwen, Rhug	5·59
,,	Hailsham	5·75	,,	Criccith, Talarvor.....	4·98
,,	Ryde, Thornbrough	4·20	,,	I. of Man, Douglas	5·50
,,	Emsworth, Redlands ...	3·19	XII.	Stoneykirk, Ardwell Ho.	2·15
,,	Alton, Ashdell	3·79	,,	New Galloway, Glenlee	3·70
III.	Oxford, Magdalen Col..	2·66	,,	Lilliesleaf, Riddell	4·27
,,	Banbury, Bloxham	...	XIII.	N. Esk Res. [Penicuick]	6·00
,,	Northampton, Sedgebrook	3·70	,,	Edinburgh, Blacket Pl..	4·14
,,	Alconbury	3·26	XIV.	Glasgow, Queen's Park..	3·70
,,	Wisbech, Bank House...	4·02	XV.	Inverary, Newtown	4·96
IV.	Southend	3·19	,,	Oban, The Corran	3·13
,,	Harlow, Sheering..... ...	3·46	,,	Islay, Gruinart Schools..	2·24
,,	Colchester, Lexden	2·64	XVI.	Dollar.....	4·10
,,	Rendlesham Hall	2·83	,,	Balquhidder, Stronvar...	7·18
,,	Rushall Vicarage	2·69	,,	Ballinluig	1·93
,,	Swaffham	4·42	,,	Dalnaspidal H.R.S.....	7·61
V.	Salisbury, Alderbury ...	3·10	XVII.	Keith H.R.S.....	7·00
,,	Bishop's Cannings	2·94	,,	Forres H.R.S.	2·92
,,	Blandford, Whatcombe .	3·55	XVIII.	Fearn, Lower Pitkerrie..	1·90
,,	Ashburton, Holne Vic...	5·48	,,	N. Uist, Loch Maddy ...	4·09
,,	Okehampton, Oaklands.	5·13	,,	Invergarry.....	6·81
,,	Hartland Abbey	4·94	,,	Aviemore H.R.S.	5·12
,,	Lynmouth, Glenthorne.	6·19	,,	Loch Ness, Drumnadrochit	8·42
,,	Probus, Lamellyn	5·17	XIX.	Invershin	2·93
,,	Wellington, The Avenue	3·12	,,	Scourie	6·11
,,	Wincanton, Stowell Rec.	...	,,	Watten H.R.S.....	3·40
VI.	Clifton, Pembroke Road	5·04	XX.	Dunmanway, Coolkelure	4·59
,,	Ross, The Graig	2·85	,,	Cork, Wellesley Terrace	3·12
,,	Wem, Clive Vicarage ...	2·93	,,	Killarney, Woodlawn ...	4·19
,,	Cheadle, The Heath Ho.	3·13	,,	Caher, Duneske	2·45
,,	Worcester, Diglis Lock	1·56	,,	Ballingarry, Hazelfort...	2·82
,,	Coventry, Coundon	2·86	,,	Limerick, Kilcornan ...	2·65
VII.	Ketton Hall [Stamford]	...	,,	Broadford, Hurdlestown	2·48
,,	Grantham, Stainby	3·82	,,	Miltown Malbay	3·67
,,	Horncastle, Bucknall ...	3·69	XXI.	Gorey, Courtown House	3·29
,,	Worksop, Hodsck Priory	3·68	,,	Athlone, Twyford	2·39
VIII.	Neston, Hinderton	4·05	,,	Mullingar, Belvedere ...	2·90
,,	Southport, Hesketh Park	4·92	,,	Longford, Currygrane...	2·59
,,	Broughton-in-Furness ...	6·46	XXII.	Woodlawn	3·37
IX.	Ripon, Mickley.....	4·12	,,	Crossmolina, Enniscoe ..	9·45
,,	Melmerby, Baldersby ...	3·78	,,	Collooney, Markree Obs.	4·90
,,	Scarborough, Obs.	4·58	,,	Ballinamore, Lawderdale	3·69
,,	Middleton, Mickleton ...	3·59	XXIII.	Lough Sheelin, Arley...	2·10
X.	Haltwhistle, Unthank...	4·71	,,	Warrenpoint.....	2·00
,,	Bamburgh	6·18	,,	Seaforde..	2·21
,,	Keswick, The Bank.....	8·29	,,	Belfast, Springfield	3·58
XI.	Llanfrechfa Grange	5·23	,,	Bushmills, Dundarave..	4·47
,,	Llandovery	5·50	,,	Stewartstown	2·67
,,	Castle Malgwyn	6·31	,,	Killybegs	8·57
,,	Builth, Abergwesyn Vic.	8·01	,,	Lough Swilly, Carrablagh	5·76
,,	Rhayader, Nantgwillt ...	6·97			

OCTOBER, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours Dpth	Greatest Fall in 24 hours Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	3·05	+ ·16	·67	12	18	62·9	8, 9	29·2	28	2	14
II.	ENGLAND.	Maidstone (Hunton Court)...	4·51	+ 1·05	·54	13	20	...	...	...	...	..	...
,,	ENGLAND.	Strathfieldsaye	3·25	...	1·09	6	22	...	...	...	...	...	...
III.	ENGLAND.	Hitchin	3·36	+ ·29	·41	15	21	62·0	3	28·0	27	7	...
,,	ENGLAND.	Winslow (Addington)	3·38	+ ·29	·59	25	23	63·0	3	28·0	27	9	14
IV.	ENGLAND.	Bury St. Edmunds (Westley)	3·24	— ·03	·52	12	16	62·0	3	30·0	30	..	...
,,	ENGLAND.	Norwich (Brundall)	3·38	...	·40	12	24	64·4	3	29·0	30	2	12
V.	ENGLAND.	Weymouth(LangtonHerring)	2·47	— 1·07	·80	6	19	63·0	3	32·0	31	1	...
,,	ENGLAND.	Torquay (Cary Green)	3·99	...	·86	6	21	65·6	3	33·6	23*a*	0	10
,,	ENGLAND.	Polapit Tamar [Launceston]..	5·21	+ ·28	·80	5	25	64·9	3	26·1	23	8	10
VI.	ENGLAND.	Stroud (Upfield)	3·72	+ ·69	·75	25	21	65·0	3	29·0	21*b*	6	...
,,	ENGLAND.	ChurchStretton(Woolstaston)	3·84	+ ·07	·60	16	23	63·5	2	30·0	29	8	18
,,	ENGLAND.	Tenbury (Orleton)	2·24	— ·97	·39	16	20	65·0	3	24·7	21	11	17
VII.	ENGLAND.	Leicester (Barkby)	3·08	— ·07	·50	16	25	63·0	3	23·0	30	15	20
,,	ENGLAND.	Boston	3·88	+ ·77	·75	16	20	65·0	16	30·0	23	5	...
,,	ENGLAND.	Hesley Hall [Tickhill].....	3·23	+ ·13	·75	18	24	64·0	2	27·0	27	9	...
VIII.	ENGLAND.	Manchester(PlymouthGrove)	4·34	+ ·97	·85	6	22	66·0	2	26·0	28	11	14
IX.	ENGLAND.	Wetherby (Ribston Hall) ..	2·70	— ·43	·55	6	19	...	...	...	...	...	...
,,	ENGLAND.	Skipton (Arncliffe)	6·08	+ ·05	·86	5	24	..	...	...	...	...	...
,,	ENGLAND.	Hull (Pearson Park).	6·01	+ 2·36	1·02	18	26	62·0	8	27·0	27	14	15
X.	ENGLAND.	Newcastle (Town Moor)	5·68	+ 2·56	1·03	10	25	...	...	...	...	...	...
,,	ENGLAND.	Borrowdale (Seathwaite).....	13·02	+ 2·43	2·65	7	22	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	4·77	+ ·23	·83	24	19	...	...	...	...	...	...
,,	WALES.	Haverfordwest	6·89	+ 1·74	1·15	9	23	62·1	3	27·9	29	5	15
,,	WALES.	Aberystwith (Gogerddan)	4·79	— ·56	·60	6	20	62·0	2	...	...	...	...
,,	WALES.	Llandudno.....	4·20	+ ·81	·81	7	21	64·5	2	32·5	29	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	4·19	+ ·93	1·76	7	12	60·8	2	23·0	28	12	...
,,	SCOTLAND.	Jedburgh (Sunnyside).....	5·85	+ 3·20	1·76	11	17	61·0	2	25·0	23	7	...
XIV.	SCOTLAND.	Colmonell	3·51	...	·90	7	15	67·0	2	21·0	22	11	...
XV.	SCOTLAND.	Lochgilphead (Kilmory)	4·80	+ ·01	·84	23	17	...	...	23·0	22	18	...
,,	SCOTLAND.	Mull (Quinish).....	4·58	— ·71	1·19	8	17	...	...	...	...	...	...
XVI.	SCOTLAND.	Loch Leven Sluices	3·90	+ ·94	1·00	8	11	...	...	...	...	...	...
,,	SCOTLAND.	Dundee (Eastern Necropolis)	2·90	+ ·66	·90	7	17	63·3	2	25·5	25	9	...
XVII.	SCOTLAND.	Braemar	5·68	+ 2·07	1·26	18	21	62·7	1	17·0	25	16	25
,,	SCOTLAND.	Aberdeen (Cranford)	4·53	...	1·10	18	23	65·0	1, 2	26·0	24*c*	9	..
,,	SCOTLAND.	Cawdor (Budgate)	5·01	+ 2·28	1·00	9	19	...	...	...	...	...	...
XVIII	SCOTLAND.	Strathconan [Beauly]	7·01	+ 2·36	1·08	19	14	...	...	...	...	..	...
,,	SCOTLAND.	Glencarron Lodge.....	7·32	...	1·42	9	24	55·7	1	23·0	25	14	...
XIX.	SCOTLAND.	Dunrobin	3·07	— ·24	·50	7	21	61·0	1	30·0	10*c*	5	...
,,	SCOTLAND.	S. Ronaldsay (Roeberry).....	5·25	+ 1·52	1·01	5	23	56·0	1	30·0	10	3	...
XX.	IRELAND.	Darrynane Abbey.....	5·72	...	·79	1	23	...	...	...	...	...	...
,,	IRELAND.	Waterford (Brook Lodge) ...	2·79	— 1·03	1·12	7	16	68·0	1	27·0	28	6	...
,,	IRELAND.	O'Briensbridge (Ross)	3·19	...	·44	24	19	..	...	...	...	...	...
XXI.	IRELAND.	Carlow (Browne's Hill)	3·90	+ ·61	1·17	7	18	...	..	...	...	...	...
,,	IRELAND.	Dublin (FitzWilliam Square)	2·51	— ·87	·77	7	22	63·7	2	30·1	23	2	13
XXII.	IRELAND.	Ballinasloe	...	...	...	...	...	...	...	...	...	...	...
,,	IRELAND.	Clifden (Kylemore)	8·63	...	1·40	7	26	...	...	...	...	.	...
XXIII	IRELAND.	Waringstown	2·76	+ ·05	·49	7	21	60·0	1	26·0	13*d*	11	18
,,	IRELAND.	Londonderry (Creggan Res.).	4·96	+ 1·29	·87	7	30	...	...	...	...	...	...
,,	IRELAND.	Omagh (Edenfel)	4·36	+ 1·26	·57	7	25	59·0	1	27·0	27	5	15

+Shows that the fall was above the average ; —that it was below it.

a—and 29. *b*—and 27. *c*—and 25. *d*—and 28.

METEOROLOGICAL NOTES ON OCTOBER, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

ADDINGTON.—A wet month, with very few really fine days, and a large flood on the 16th and 17th. Dense fog on 28th and 29th. Frequent slight frosts from the 20th to the end; many tender plants cut off on the 23rd, and all killed on the 28th. Autumn tints very beautiful.

BURY ST. EDMUNDS, WESTLEY.—R nearly every day till the 21st. Very little frost, but a cold month, the temp. reaching 62° on only one day. TSS on 5th, 10th and 14th; T on 25th.

NORWICH, BRUNDALL.—Much depressing, damp weather, with frequent rains, though at no time excessively heavy. The frequency of the rain made it appear wetter than many months which have had a much larger total fall. Severe TS on the morning of the 14th, quite overhead at 7 a.m. Stormy with H and L on 5th; S.W. gale on 8th; stormy with T and L on 25th.

WEYMOUTH, LANGTON HERRING.—The first ten days of the month were mild, with a good deal of wet; the weather became much colder on the 11th, on which day the temp. was 10° lower than on the 10th; and with the exception of the 15th and 16th, it continued cold to the end. On 16 days the min. temp. was below 40°, and on 14 days the max. was below 50°. The mean 9 a.m. temp.—46°·5—is 3°·5 below the average. Solar halo on 1st; T and L on 18th.

TORQUAY, CARY GREEN.—Rainfall ·33 in. below the average, the fall for the 10 months January to October being 8·75 in. below the average. Mean. temp. 47°·8, or 3°·5 below average. Duration of sunshine, 120 hours, being 4 hours above the average; 5 sunless days.

POLAPIT TAMAR [LAUNCESTON].—Very wet throughout, but the total fall for the first ten months of the year is 4·14 in. less than the average. The first ten days were generally rough and stormy, and the last fortnight, though calm, was very cold. H on 4th, 5th, 18th, 25th and 27th; S.W. gales on 6th, 7th, 8th and 25th. S on 11th.

STROUD, UPFIELD.—Severe S.W. gales on 6th and 7th. S storm on 25th.

WOOLSTASTON.—A cold, wet month. Mean temp. 43°·5. S on 10th and 24th.

LEICESTER, BARKBY.—A cold, wet month, with considerable fog and some sleet and flakes of S. Last swallow seen on 18th. Mean temp. 44°·1.

MANCHESTER, PLYMOUTH GROVE.—The coldest October since observations commenced in 1868. H storm, T and L on 10th. S and sleet on 11th. Thick fog on 19th, 20th, 22nd and 31st. Dense fog on 27th. Mean temp. 43°·5.

NEWCASTLE.—The heaviest month's R at this station since August, 1890, when the total fall was 6·22 in.

SEATHWAITE.—S on 11th, 1½ in. deep at 9 a.m., on 22nd 1 in. deep, and on the 25th 2 in. deep. Six falls of R of exceeding an inch in 24 hours.

WALES.

HAVERFORDWEST.—The most stormy October since 1886, and unprecedented damage was done on this coast. On the 8th a great tempest arose from S.S.E. with heavy R, and this, together with a very high spring tide, caused the

waters to rise to such a height that houses were flooded, and on the exposed beach at Newgate the ocean broke in, overwhelming the lofty pebble barrier and sweeping away a lonely house on the shore. A heavy fall of S on 11th, and S on the mountains on 26th. L and T on 7th, 25th and 29th; L on 9th, 11th and 18th.

ABERYSTWITH, GOGERDDAN.—Very stormy and cold throughout the month. S on the 25th.

SCOTLAND.

CARGEN [DUMFRIES].—Another dreary, sunless month. The mean temp.—43°·4—is nearly 4° below the average of 37 years, and was lower only in 1892—43°·1. A deep depression crossed on the 8th, accompanied by a severe S.W. gale; one of the highest spring tides of the year occurred concurrently, and an exceptionally heavy rainfall having taken place during the previous night, the Nith was in heavy flood, overflowed its embankments, and a large tract of arable land was submerged, and much damage done. 1·76 in. of R fell on the 7th, and on only six occasions has more fallen in 24 hours since observations commenced. The total R for the 10 months of the year is 2·63 in. below the average. With the exception of the gale on 8th, and stiff breezes on 5th and 11th, light winds, generally E., prevailed. Sunshine again much deficient. S covered the district on the 25th.

JEDBURGH.—The weather was most ungenial during the month, N. and N.E. winds prevailing, with very little sunshine and low temperature, excepting about six days. Country work has gone on well. The rainfall of the month has never been so heavy during 32 years.

BRAEMAR.—A very unsettled, cold month.

ABERDEEN, CRANFORD.—The month has been cold and wet, with little sunshine and N. or N.E. wind after the 10th.

S. RONALDSAY, ROEBERRY.—A very cold, wet and windy month. N. or N.E. wind on 16 days. Mean temp. 42°·6, being 3°·9 below the average of six years.

IRELAND.

DARRYNANE ABBEY.—A cold, wild month. The very high tide and strong gale on the night of the 7th-8th broke over the embankment, and flooded the rain gauge. [Amount originally estimated has been confirmed by comparison with two other records.—ED.].

WATERFORD, BROOK LODGE.—H on 4th. Heavy gale from S.W. to S.E. on 8th. S from 7 to 11 a.m. on 11th. L on 12th and 27th. Lunar halo on 20th.

DUBLIN.—As in 1892 and 1895, so in 1896 October proved a very cold month. It was also inclement in the matter of wind and R. Had it not been for a few warm days at the beginning, the mean temp. would have been the lowest on record in recent years. Mean temp. 45°·0, or 4°·7 below the average. TSS on the evening of the 29th; L on night of 21st. High winds on 11 days, attaining the force of a gale on the 8th. Foggy on 4 days; H on 3 days; sleet on 3 days. A lunar halo on the 18th; solar halos on 7th, 10th and 23rd; aurora borealis on the evening of the 11th.

WARINGSTOWN.—Nights unusually cold. S on 28th.

OMAGH, EDENFEL.—The weather of October has been of the same stormy, wet and unsettled character that has prevailed since the 17th August, between which date and the 13th October but five days occurred without rain, mostly heavy; but this cessation was of short duration, as from the 17th to the end was equally unpropitious, and the damage to all crops has been irreparable.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXXI.] DECEMBER, 1896. [PRICE FOURPENCE, or 5s. per ann. post free.

WEATHER IN THE LAST CENTURY. 1713—1745.

EARLY records of the weather being somewhat rare, the following notes are, we think, worthy not merely of preservation, but of publication. They were kindly furnished to us by Mr. Basil Woodd Smith, of Hampstead, and are derived from a register kept at Richmond, Surrey, by Mr. George Smith, a Proctor to Queen Anne. The register contains a record of daily observations (made without instruments) from April, 1713, to June, 1745. Mr. Smith died, aged 70, in July of that year, and was buried in Richmond Churchyard, where his tombstone is to be found. A transcript of the register was given some time ago to the Royal Meteorological Society and placed in its library.

We give chiefly the summaries made by the observer, and a few of his occasional notes.

It is to be observed that—

1. The recorder is a good deal given to the use of superlatives.
2. He uses the word "season" sometimes to express a very limited space of time, and at others in its usual more extended sense.
3. In his summaries at the end of December it is not always clear whether "winter" refers to the previous winter or to the actual one. In some cases the note seems to have been filled in later.
4. The dates are those of the Old Style, requiring the addition of eleven days to bring them into correspondence with dates since September 2nd, 1752, when the New Style came into use.

A propos of the frequent reference to figs, a family tradition relates that Mr. Smith was in the habit of sending a basket of figs to Queen Anne every year. On one occasion he omitted his customary present, and on the Queen saying, "Proctor, how is it you have sent me no figs this year?" he replied: "Please your Majesty, the basket was not returned."

1712—13. Unsettled year. Jany. to May chiefly cold. "Dull, wet summer." June 23, 24 "very hott"; 25, 26 "cold as Xmas." July warmer, but (30) "generally a very wet season since S. Swithin, no fruit"; Aug. 31. "Good harvest weather all this moon, but the first fortnight extream fine." Nov. 8. "Small rain froze or it fell, extream slippery." December warmer. (18) "A great storm, thunder, lightning, hail and rain from N.W."

1713—14. Jan. 25. "The dryest time that ever I knew, and the finest weather; like Aprill." 31. "Mighty fine." Feb. 11–14. "Dusty as May. Warm enough." 16. "The largest snow I ever saw." 19. "The Highest Tyde ever known." April 5. Very hard frost killed fruit." May 6. "Very hard frost, rain all day from N.E." June 21–27. "Extream hott and clear and dry. Wind E most part." July 25–31. "Extream good harvest weather; corn all in by end of month." Aug. 1. "Qu: Anne dyed at ½ after 7 morn." Sep. 18. "King George landed at Greenwich at 6 even." 20. "K George entred thro London." Summer generally fine. Dec. 13. "Hard frost as ever known; in one night much ice in Thames."

1714—15. April 22. "Totall Eclipse of the Sun, very dark; Starrs to be seen." June 30. "Extr: wet season, damaged hay and corn." Year appears to have been generally warm, but no further special remark called for by weather till Nov. 11, "hard frost." 20. "Very thick stincking fog all day." Frost lasted off and on till Dec. 27, "Ice fixed" in river. 29. "Thames passed; people went over."

1715—16. Jan. 7. "Ground like glass." 9. "hardest frost of all." 19. "Great snow in night." 26. "Ice broke at 3 morn." March 5. "Extraordinary appearance in the air, light and fire and dark clouds." (Dr. Halley did not see this, but describes the aurora of Nov. 6, 1719, which is not noticed by our observer, as the first he had seen.) Summer mostly dull. Sept., frequent high winds. 13. "Great storm all night; great harm."

1716-17. March 30. "Streaks of light in the sky from N." Weather mostly warm and cloudy in first months of year. Some hot days in June. 16. "Thunder and very great lightning." Summer mostly hot. Nov. 23. "Very terrible night for wind and rain, thunder and lightning." Dec. 14. "Morn. highest Tyde ever known, tho the moon in the last quarter; occasioned probably by a great Storm all night at N.W. Overflowed Westminster and keys at Custome house. Extr. great Damage in Holland."

1717—18. Observer's summary. Dec. 31. "The Sumer was very hott and dry; extr. good grapes; very little other good fruit; 2nd crops white figs ripe; harvest very forward, all got in begin. Sept. Extr. mild winter."

1718—19. March 19. "About 8 ev. extr. ball of fire in the sky, light as sun." Aprill "Extr. dry season." Dec. 31. "This Summer was very hott and dry; good grapes, no other fruit. The

second crop of figs ripe at Michaelmas; very mild dry winter, water very low."

1719—20. Dec. 31. "All Xmas warm as April, trees ready to blossom. The Summer wet and green; with little good fruit. Grapes late ripe, but some good. Winter warm and wet, no frost, mildest season ever known."

1720—21. No summary. Jan. and Feb. cold. Summer apparently cloudy and dull. Autumn variable.

1721—22. "Wet Sumer; fair fine Autumn; very good grapes; fine fair mild dry winter."

1722—23. May 31. "Extror. dry Season as ever known." June 28 and Sep. 30 similar entries. Dec. 31. "Longest Sumer ever known, very dry; good grapes; 2 crop of figs, some blew (? purple) ripe. Dry warm winter. 3 weeks at Xmas fine weather as April."

1723—24. April 30. "A very kindly fine April." May 11. "Sun eclipsed almost total dark, but not plain to be seen by reason of dark clouds." June 9. "Extream hot. Aftn. great storm, rain, great hail thunder and very high wind N., perfect hurricane and Spout, Even very hot." Dec. 31. "Very long Sumer, good grapes. 2nd crop figs ripe in Sep., great plenty all sorts of fruits, especially apples and pears, tho' no good pears. Fine winter, dry till lately."

1724—25. Feb. 28. "Extr. dry time. Fine weather." June 30. "The wettest and coldest season ever known in Sumer; fires kept every night till 28 June." July 31. "This whole month more like Winter than Sumer." Dec. 31. "Extraordinary unkindly Sumer. Constant Rains and Cold; no good fruit, rotten before ripe; no grapes at all; figs rotted on the trees. Winter warm and wet; very little frost, no snow."

1725—26. Sept. 30. "A great Landwater for 10 daies." Nov. 30. "Finest November ever known." Dec. 31. "Very kindly year; long Sumer; few grapes on vines, those extraordinary good; good fruit all sorts. 2nd crop figs ripe, wet winter, great land waters, and very hard frost, and great snows before Xmas."

1726—27. Feb. 28. "A very great landwater as known these many years. Springs extr. high, wet season." Nov. 30. "Waters very low." Dec. 31. "Kindly year; vast quantity of grapes and very good. 2nd figs ripe in Sept., no apples or pears. Dry winter, waters very low, a deal of foggy weather and some very hard frost and great snow before Xmas."

1727—28. No summary. Weather not very marked.

1728—29. Feb. 28. "This has been the longest coldest season ever known, the spring is now as backward as in December. Dec. 31. "Very wet and warm winter, no frost or snow."

1729—30. April 30. "Very dry burning weather." July 3. "Spout of rain and wind; extr. great shower." Oct. 31. "Very dirty season as ever known; warm." No general summary of year.

1730—31. May 31. "Exceeding dry Season, no grass." Dec. 18.

"Fair and fine, cold." 27. "Extream cold, hardest frost ever known in one night with snow." 29. "Snow all gone, warm, fine." 31. "Mild. Short winter, very dry time. Thames as low and dry as in Sumer."

1731—32. July 31. "Very dry, good harvest." Aug. 31. "Very dry season." Sep. 30. "Very dry season." Dec. 31. "The year ends with warm moist dirty weather."

1732—33. No summary. Apparently cool summer. Dec. 31. "Cloudy warm dirty weather, S. and S.W. with some storms ends the year."

1733—34. Dec. 31. "An extra. wet season, land floods very high, and lasted till the middle of January." No general summary.

1734—35. Feb. 28. "A very wet dirty time; land floods." Dec. 31. "Wet warm dirty season. Very wet unkind year. No grapes. Good plumbs and apples."

1735—36. Feb. 16 "Greatest tyde ever known; much damage in cellars and warehouses. Marshes overflowed, cattle drowned." 29. "Extream cold all the month." July 31. "An extream hot time." Aug. 31. "Extr. fine weather." Oct. 31. "A very warm, dirty, hazey month." Dec. 31. "A very mild winter, wet summer, little good fruit.

1736—37. April 30. "Dry and dusty." May 31. "Very hot dry time." June 30. "Very dry season." July 31. "Cool season." Aug. 31. "Cold wet season." Sep. 30. "Warm and wet season." Dec. 31. "Mild winter, unkindly wet summer, no good fruit."

1737—38. Jan. 31. "The finest season for the time ever known." April 30. "Very cold unkindly season; nothing grows." Aug. 31. "A very wet unkindly cold season, no good fruit." Sep. 30. "A very wet time as ever known. Extr. heavy showers, little thunder." Nov. 30. "The most kindly month in the whole year."

1738—39. April 30. "A very unkind season till the 25. Since, fine growing weather. All fruit killed." June 30. "Very fine hay harvest." Sep. 30. "All the month wet, dark, warm, too close; a very bad season for fruit and corn." Oct. 30. "This month pretty good weather, but cold." Dec. 30. "Thames froze over in 4 daies. Storm of wind 48 hours."

1739—40. Jan. 1. "Some people walked over the Thames." (Frost continued till Feb. 1, when thaw began in day, frost returning each night.) Feb. 11. "Ice all gone in Thames upward but not broke abt. London." 13. "Ice begins to run in Thames." 17. "Ice broke in Thames." 23. "Ice gone at London." 29. "This was the severest frost I ever knew, and the most kindly thaw. No rain, roads good, all garden stuff destroyed." Hard frost again in March. 31. "A very backward spring, dry and dusty as summer; no considerable rain 3 months past; the river as low as ever known." April 21. "Very great storm snow and wind from 10 to 2." 30. "A very cold unkind season." May 31. "Extr. dry dusty and cold, very unpleasant season." July 31. "A very dry time, pleasant

weather." Aug. 31. "Fine harvest weather, great dews." Sep. 30. "The coldest weather ever known at Michs. Piercing cold." Dec. 31. "A very unkind year; no good fruit, nor warm weather; winter severe; storms and frost with great snow."

1740—41. March 30. "A very terrible unkind season." Apl. 30. "A very dry cold season." June 30. "Glorious hay harvest." July 31. "Fine harvest as ever known; dry, dusty, no grass." Aug. 31. The finest harvest weather ever known; hot and dry; no grass, good fruit, harvest in by 20 August." Sep. 30. "The finest season ever known; warm and kindly." Oct. 31. "Fine season as ever known." Nov. 30. "Very mild kindly season, warm and fine." Dec. 13. "Clear very hard frost, great rime not melted by the sun tho' shone all day; trees white as snow." Dec. 31. "A very kindly year; sumer very hot and dusty; very good fruit, plumbs and grapes: Winter mild and fine till Xtmas, and then hard frost; ice in Thames."

1741—42. March 31. "An extr. cold dry time as ever known; no rain all this month; dusty as Midsummer." April 30. "Extr. dry and dusty time." June 30. "Seasonable showers after a very dry long season." Aug. 31. "An extraordinary dry season, fine harvest but no grass, nor good fruit; great plenty of corn. No rain for five weeks, hot burning sun." Sep. 30. "Very cold dry unkindly season, no grass; grapes not ripen." Oct. 31. "Very kindly seasonable weather all this month with high winds." Dec. 13. "Hardest frost, much ice in Thames, boates not able to go."

1742—43. Jan. 27. "In night great tyde." Feb. 20. "Very fine season." 28. "An extraordinary pleasant month." March 31. "A cold unkindly season, tho' some fine raines." Frost and snow first few days of April. April 30. "The beginning of this month cold and dry and dusty; the end extr. seasonable, fine raines." July 31. "Very fine kindly harvest and great plenty." Aug. 31. "Dry dusty time." Nov. 30. "Very fine weather latter end of the month." Dec. 31. "Hardest frost, clear, ice runs in river."

1743—44. Jan. 6. "Thames clear of ice." Feb. 1. "Comet appears plain and bright all evening till past eight." 18, 19, 24, 25, 28. Storms of wind. 29. "A very stormy season." May 31. "Very hot dry and dusty time." June 20. Similar entry. July 31. "Good harvest weather." Aug. 31. "A very stormy season." Sep. 10. "Great storm of wind, lasted 24 hours; all fruit blown down." Sep. 30. "A warm wet season. No grapes. Plumbs and pears extra good." Oct. 29. "Great landwater." Dec. 31. "Extr. fine weather ends the year."

1744—45 No special character. Diary ends June 3, 1745. Mr. Smith died July 26.

THE SCIENTIFIC USE OF KITES.

To the Editor of the Meteorological Magazine.

SIR,—I appreciate very highly your kindly words relative to the use of the kite for scientific purposes, and, therefore, hasten to reply to the query on page 148 of your magazine for November, where you say "a kite can go up only when there is wind, a balloon can go up in a calm; a kite cannot carry as much weight as a balloon. Why are kites better than captive balloons?" I reply, because the captive balloon has a narrow field of usefulness, whereas the kite has a wider field and is more efficient therein when the wind is blowing. May I call your attention to the fact that, in the greater portion of the United States, there are many days when it is too cold to manage a balloon on account of the stiffness of the cordage, and the material of which the bag is made. There are also many other days on which the wind and upper currents are entirely too strong to allow of operating a captive balloon at all. There are many days of rain or snow when the balloon is laden by these so heavily that it will not rise to advantage. In general, the captive balloon rises but a 1,000 ft., whereas a kite may go up to 10,000. Probably, you have the same difficulties occasionally in Europe. At many of our stations the captive balloon would be useless half the time, and, except in perfect calms, far less efficient than a kite. Hitherto we have not found the rain, the wind, or the cold to interfere seriously with kites. There are, of course, many hours when the wind is too light for a heavily laden kite to start, but in such cases a lighter kite or balloon may be used to assist. The advantages of the kite over the free balloon are manifold, the most important items are: (1) You are sure of having the thermometers well ventilated; (2) You have no need of travelling 500 miles to get your records back again; (3) Relatively slight expense of money and time. The advantages over captive balloons are especially manifest in windy weather, when the wind causes the balloon to oscillate violently within a few hundred feet of the ground, while the cord that holds it captive is inclined at an angle of ten degrees, whereas the same wind elevates the kite to an angle of fifty or sixty degrees, and to a height of five or ten thousand feet, where it floats with a steadiness that is beautiful to behold. The self-registering apparatus may be made of various weights, from one pound up to fifty, and our kites will carry these up as easily as will a balloon. If either kite or balloon breaks loose, the balloon is liable to be carried away much farther than a kite, therefore, more liable to be lost entirely. Our biggest kites that broke away at a height of 7000 ft. during a violent local storm, were recovered unharmed after they had descended to the ground fifteen miles away.

We are confident that there is an important field of usefulness for the kite, and we hope to develop this without neglecting the balloon.

Will not our European Colleagues join in the work?

With highest regard, I remain,

Yours truly,

WILLIS L. MOORE,

Chief of Bureau.

U.S. Department of Agriculture, Weather Bureau,
Washington, D.C., November 30th, 1896.

[Prof. Moore has made out a very strong case for kites, and as he says that the balloon shall not be neglected, we think that the matter may be left where it is.

As regards European co-operation, although we have not heard of anything being done in England, we believe that much is being attempted on the Continent.—ED.]

REVIEWS.

Elementary Meteorology for High Schools and Colleges, by FRANK WALDO, Ph.D., late Junior Professor, U.S. Signal Service, Member of the Austrian and German Meteorological Societies, &c. American Book Company, New York, Cincinnati and Chicago [1896]. Sm. 8vo, 373 pages, 121 maps and engravings.

YET another American work on Meteorology, and one for schools! Surely with all this teaching there ought to be amply sufficient readers to support an American Meteorological Magazine.

We do not know how to reconcile the rapid succession of works by Waldo (1893), Davis (1894), Russell (1895), and now a fresh one by Waldo (1896), with the death from inanition of our excellent friend the *American Meteorological Journal.*

However we are not called upon to solve that problem, but to express our opinion of the new arrival. We like it very much, and think that many whose school and college days are only memories in the far past, would enjoy this book—the like of which assuredly they never had either at school or at college.

It seems to us that Dr. Waldo has rarely forgotten for whom he was writing, and while not allowing any wrong statement to appear, has checked himself when tempted to run off into elaborate formulæ or detail—thus producing a well balanced work which, as far as we have noted, few could read without pleasure and profit.

On page 104 Dr. Waldo has made a slight slip—purely accidental. The words used might lead a youth to suppose that Robinson's cups are the only pattern of anemometer!

On page 172 there is a useful block representing Solar Halos and Parhelia, but good as it is, we think that the insertion of a Z or the word Zenith would improve it, and we should have added the vertical circle, through the sun, which produces the phenomenon known as a "Sun pillar." We also notice that the parhelia are represented as absolutely at the intersections of the various halos, which is rarely the case.

There is one expression (perfectly obvious to those familiar with the subject) on p. 176 which we should alter. Speaking of the aurora borealis Dr. Waldo says :

"The auroral arch usually spans the sky in an east-westerly direction. In the middle latitudes it is seen to the north, and in extreme northern latitudes to the south."

We think that for the moment the author had forgotten the southern hemisphere, and the aurora australis, and did not realize that his expression "to the south" might be imagined to mean on the southern horizon. He doubtless meant to state that arctic travellers have reached latitudes north of the auroral belt, and therefore seen it south of the zenith, but we think that it might be expressed more clearly.

The half chapter devoted to Tornadoes is excellent, but we should have given the pressures in inches of mercury, as well as in pounds. Though a barometric depression in their centre of 7½ *inches* seems to us excessive, Dr. Waldo doubtless has Prof. Ferrel at his back, and therefore it is somewhat rash to criticize this value, but a third of it would give an expansive force of more than half a ton on each square yard of surface, and a thirtieth of it or 0·25 inch would give a lifting force of about a ton for each 13 square yards—or two tons to the ceiling of a small room 15 ft. square. Therefore, terrible as is the wreckage along the path of a tornado, we do not see the need for imagining a depression so far beyond anything ever observed. We shall probably not often have a better chance of a record of the actual depression than that of the barograph in the *Tour St. Jacques* during the small whirlwind which stripped roofs and overturned so heavy a vehicle as a Paris omnibus—its centre went within a few yards of the *Tour St. Jacques* and the barometer fell suddenly and momentarily—not 7½ inches but 0·24 inch, almost precisely what we suggested.

The whole tone of the book is good, for while the author brings in the latest discoveries (*e.g.*, Argon) we come on sentences like the following :

"The science is as yet but partially developed, and much that is at present accepted as fact will be modified by future investigations," and again, after showing that theoretically carbon dioxide ceases at about 10 miles above the earth's surface, water vapour at 12, oxygen at 30 and nitrogen at 35 miles, he states :

"Observations indicate, however, that the atmosphere extends much higher than this, which shows that our knowledge of the laws of atmospheric gases is still incomplete."

As a rule the illustrations are good, but those on pages 31, 218 and 244 are feeble, and why should metric values be used on them whereas in all the rest of the work English scales are employed? On the other hand we think that this is the first text book illustrated with engravings of snow crystals made from photographs of the crystals themselves. The book is handy, well printed and on good paper.

The Psychrometer. 8vo, 4 pp.

This is a remarkable paper, only four pages, with no indication of author, printer, or place—but it reached us in an envelope dated at Washington, U.S.A., Oct. 22nd, 1896.

The writer is perhaps prudent in preserving his anonymity, considering how severely he criticizes not merely the Assmann Aspirator, but the Editors of the *Zeitschrift* for admitting two recent articles. The anonymous writer is evidently one of vigour and ability, though we have an impression that even he does not know quite all that has been recently done respecting the theory of the wet bulb thermometer, but we do not at present intend to take any part in the controversy. A copy has doubtless been sent to the Editors of the *Zeitschrift*, and they will deal with it as they think best.

It is however rather amusing that at the end of September the International Congress of Meteorologists at Paris recommended the use of the Assmann Aspirator as if it were perfection, and in the early days of October this paper attacking it was being sent to the printer.

ROYAL METEOROLOGICAL SOCIETY.

THE first monthly Meeting of this Society for the present session was held on Wednesday, November the 18th, at the Institution of Civil Engineers, Great George Street, Westminster; Mr. E. Mawley, F.R.H.S., President, in the chair.

Mr. W. Ellis, F.R.S., presented his Report on the Proceedings of the International Meteorological Conference, held at Paris, from September 17th to 23rd, which he attended as the delegate from the Royal Meteorological Society.

The subjects suggested by the Society for discussion were:—

Question 6.—"The registration of bright sunshine." It was resolved that for the purposes of general climatology it is necessary that the instrument shall be so placed as to have an uninterrupted horizon. The number of hours of sunshine should be referred to the total apparent duration of the day, but with the application for each instrument of a correction relative to observations when the sun is close to the horizon.

Question 7.—"The desirability of more extended observations on infiltration into the soil, and uniformity in the same." The Committee recorded that they had listened with much pleasure to the discussion to which the question had given rise, but that it appeared to be impossible, in the actual state of the question, to frame any resolution thereon.

Question 8.—"The general adoption of a standard anemometer for the determination of the velocity of the wind."

Question 9.—"The general adoption of a uniform system of exposure for anemometers." Resolved that the Sub-Committee is of opinion that it is not possible in the present state of the question, to

recommend the use of any existing instrument as a standard, or of any mode of erection identical at all stations.

Question 12.—"Uniformity of conditions under which earth temperatures should be taken." It was recommended to continue investigations into the subject, and to prepare a report for the next Conference.

The Hon. F. A. Rollo Russell read a paper on "Haze, Fog and Visibility." From his own observations in Surrey he considers that haze is most prevalent when the wind is from the north-east, and is due probably to slight condensation of moisture by partial mixture of conflicting currents of air. The causes of fog are to a great extent the same as the causes of haze, although radiation in certain states of the air and ground plays a more conspicuous part. The main cause of fog is mixture of airs of different temperatures; and the attainment of a size of water particle so much larger than in the case of haze is due to suddenness of mixture, greater humidity, or greater differences of temperature.

The President, Admiral Maclear, and Messrs. Gaster, Marriott and Ellis took part in the discussion.

BAROMETRI DESCRIPTIO.

By Joseph Addison, 1672–1719.

We never associated "The Spectator" with meteorology, but Mr. Inwards recently called our attention to the following poem by Addison, and on the assumption that it is as novel to most of our readers as it was to us, we reprint it. Can any of our readers refer us to a good translation? If so, it might be worth while to print it.

Qua penetrat fossor terræ cæca antra, metallo
Fœcunda informi rudibusque nitentia venis;
Dum stupet occultas gazas, nummosque futuros,
Eruit argenti latices, nitidumque liquorem,
Qui nullo effusus prodit vestigia tractu,
Nec terram signo revolubilis imprimit udo,
Sed fractus sparsim in globulos formam usque rotundam
Servat, et in terretes lapsans se collegit orbes.
Incertum qua sit natura, an negligat ultra
Perficier, jubar et maturas inutile temnat;
An potius solis vis imperfecta relinquat
Argentum male coctum, divitiasque fluentes;
Quicquid erit, magno se jactat nobilis usu;
Nec Deus effulsit magis aspectabilis olim,
Cum Danaen flavo circum pretiosus amictu
Ambiit, et gratam suadente libidine formam,
Depluit irriguo liquefactum Numen in Auro.
Quin age, sume tubum fragilem, cui densior aer
Exclusus; fundo vitri subsidat in imo

Argenti stragnun; ut pluvia impendente metallum
Mobile descendat, vel contra, ubi postulat æstas,
Prodeat hinc liquor emergens, et rursus inane
Occupet ascensu, tubulumque excurrat in omnem.
  Jam cœli faciem tempestatesque futuras
Conscia lympha monet, brumamque et frigora narrat.
Nam quoties liquor insurgit, vitreoque canali
Sublatum nequeunt ripæ cohibere priores
Tum lætos sperare dies licet, arva fatentur
Æstatem, et large diffuso lumine rident.
Sine sese immodicum attolens Argenteus humor,
Et nimium oppressus, contendat ad ardua vitri,
Jam sitiunt herbæ, jam succos flamma feraces
Excoquit, et languent consumto prata vivore.
  Cum vero tenues nebulas spiracula terræ
Fundunt, et madidi fluitant super æquora fumi
Pabula venturæ pluviæ; tum fusile pondus
Inferiora petit; nec certior Ardea cœlos
Indicat humentes, medias quando ætheris oras
Tranando, crassa fruitur sublimius aura.
Discutit et madidis rorantia nubila pennis,
Nunc guttæ agglomerant, dispersas frigora stipant
Particulas, rarusque in nimbum cogitur humor:
Prata virent, segetem fæcundis imbribus æther
Irrigat, et bibulæ radici alimenta ministrat.
Quin ubi plus æquo descendens uda metalli
Fundumămat, impatiens pluviæ, metuensque procellam,
Agricolæ caveant; non hoc impune colonus
Aspicit; ostendet mox fœta vaporibus aura
Collectas hyemes, tempestatemque sonoram.
At licet Argentum mole incumbente levatum
Subsidat, penitusque imo se condat in alveo,
Cætera quæque tument; eversis flumina risis
Expatiata ruunt, spumantibus æstuat undis
Diluvium, rapidique effusa licentia ponti.
  Nulla tacet secreta poli mirabile vitrum,
Quin varios cœli vultus et tempora prodit.
Ante refert, quando tenui velamine tutus
Incedes, quando sperabis frigidus ignem.
  Augurio hoc fretus, quanquam atri nubila cœli
Disrumpunt obscura diem, pluviasque minantur,
Machina si neget, et sudum promittat apertum,
Audax carpat iter nimbo pendente viator;
Nec metuens imbrem, poscentes Messor aristas
Prosternat; terræ jam bruma incumbit inermis,
Frigoraque haud nocitura cadunt, feriuntque paratos.

JOSEPH ADDISON.

Vol. VI., p. 427. Tickell's Addison.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 1896.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	85·1	15	41·1	1	75·2	54·0	53·2	71	135·9	32·3	2·27	11	5·7
Malta	89·5	25	56·0	3	82·8	66·1	64·2	78	146·6	50·0	·00	0	3·7
Mauritius	76·6	9	58·0	26	74·6	65·0	61·2	77	124·1	49·1	1·12	13	4·9
Calcutta	93·9	9	72·7	1	89·7	77·1	76·7	83	158·7	69·4	16·42	15	7·8
Bombay	92·9	1	75·0	21	87·6	79·6	78·0	83	143·7	72·3	28·02	27	...
Ceylon, Colombo	88·2	...	73·2	5	85·8	77·3	75·3	86	151·0	70·0	8·37	18	7·5
Melbourne	62·5	10	33·2	2	56·1	42·7	43·9	80	109·0	24·2	2·58	13	6·4
Adelaide	65·3	12	37·3	20	59·2	43·4	44·2	77	125·8	28·5	3·15	19	4·9
Sydney	67·2	28	42·5	22	59·0	48·4	50·0	87	106·3	30·3	14·71	16	5·2
Wellington	66·0	17	38·5	4	55·9	45·4	44·2	80	108·0	23·0	6·00	16	5·3
Auckland	64·5	3	43·0	12	60·9	48·9	45·3	71	115·0	36·0	3·27	21	5·5
Jamaica, Kingston	91·6	16	71·8	17	89·0	75·3	69·9	70	...	...	·90	5	3·3
Trinidad	94·0	6	68·0	22	88·9	71·7	72·6	80	175·0	67·0	10·29	21	...
Grenada	84·2	7	71·0	29	82·9	74·2	72·0	82	146·2	...	8·16	21	4·0
Toronto	86·3	7	41·9	3	75·9	53·9	52·6	66	101·5	36·0	1·11	6	4·0
New Brunswick, Fredericton	84·8	20	35·0	14	72·2	46·2	48·0	62	...	...	1·92	8	4·0
Manitoba, Winnipeg	84·5	15	42·7	6	74·6	53·4	...	...	...	...	3·96	16	5·0
British Columbia, Esquimalt	86·4	26	39·3	13	65·6	48·1	48·1	81	...	...	·69	6	6·0

REMARKS.

MALTA.—Adopted mean temp. 73°·3, or 1°·8 above the average. Mean hourly velocity of wind 8·5 miles. Average temp of sea 68°·3. L on 1st and 16th. Temp. of dew point and humidity the highest yet recorded for June. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·7 below, of dew point 0°·6 above, and rainfall ·88 in. below, their respective averages. Mean hourly velocity of wind 10·9 miles or 0·5 mile below average; extremes, 26·4 on 20th, and 2·7 on 22nd; prevailing direction, E.S.E. T. F. CLAXTON.

CEYLON, COLOMBO.—Thunderstorms occurred on the 16th; distant thunder on the 12th, 13th, and 14th. D. G. MANTELL.

Adelaide.—Mean temp. 2°·2 below the average of 39 years. Rainfall ·36 in. above the average. C. TODD, F.R.S.

Sydney.—Rainfall 7·35 in. above, temperature 0°·7 below, and humidity 8·6 above, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Fine in the early part of the month. Maximum rain on 8th, 2·25 in., then fine again until the 15th, from which date until the end it was generally showery. Winds throughout moderate and variable, and frequent calms. Fogs on five days. Mean temp. 1°·6 above, and rainfall ·79 in. above, their respective averages. R. B. GORE.

Auckland.—An unusually dry and warm June, the rainfall being quite 1·50 in. below, and the mean temp. 1° above, the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 5·2 miles. Kingston rainfall one-fifth of the average, Island rainfall half the average. R. JOHNSTONE.

TRINIDAD.—Rainfall 2·25 in. above the 30 years average. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, NOVEMBER, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	1·94	XI.	Lake Vyrnwy	1·40
,,	Birchington, Thor	2·01	,,	Corwen, Rhug	1·18
,,	Hailsham	1·62	,,	Criceith, Talarvor.....	1·19
,,	Ryde, Thornbrough	·87	,,	I. of Man, Douglas	2·24
,,	Emsworth, Redlands ...	·91	XII.	Stoneykirk, Ardwell Ho.	1·14
,,	Alton, Ashdell	1·31	,,	New Galloway, Glenlee	2·03
III.	Oxford, Magdalen Col..	·73	,,	Lilliesleaf, Riddell	1·14
,,	Banbury, Bloxham	1·20	XIII.	N. Esk Res. [Penicuick]	1·60
,,	Northampton, Sedgebrook	1·04	,,	Edinburgh, Blacket Pl..	·65
,,	Alconbury	·84	XIV.	Glasgow, Queen's Park..	1·07
,,	Wisbech, Bank House...	1·05	XV.	Inverary, Newtown	5·16
IV.	Southend	1·03	,,	Oban, The Corran	4·07
,,	Harlow, Sheering..... ...	...	,,	Islay, Gruinart Schools..	1·25
,,	Colchester, Lexden	·81	XVI.	Dollar.....	1·12
,,	Rendlesham Hall	1·32	,,	Balquhidder, Stronvar...	3·12
,,	Rushall Vicarage	1·49	,,	Ballinluig	·94
,,	Swaffham	1·08	,,	Dalnaspidal H.R.S.....	2·15
V.	Salisbury, Alderbury ...	·65	XVII.	Keith H.R.S.....	1·53
,,	Bishop's Cannings	·73	,,	Forres H.R.S.	1·22
,,	Blandford, Whatcombe .	1·00	XVIII.	Fearn, Lower Pitkerrie..	·41
,,	Ashburton, Holne Vic...	1·57	,,	N. Uist, Loch Maddy ...	3·52
,,	Okehampton, Oaklands.	1·55	,,	Invergarry.....	3·52
,,	Hartland Abbey	1·47	,,	Aviemore H.R.S.	1·02
,,	Lynmouth, Glenthorne.	1·50	,,	Loch Ness, Drumnadrochit	1·15
,,	Probus, Lamellyn	1·14	XIX.	Invershin	·73
,,	Wellington, The Avenue	·87	,,	Scourie	3·92
,,	Wincanton, Stowell Rec.	1·10	,,	Watten H.R.S.....	1·63
VI.	Clifton, Pembroke Road	·75	XX.	Dunmanway, Coolkelure	3·10
,,	Ross, The Graig	·70	,,	Cork, Wellesley Terrace	1·52
,,	Wem, Clive Vicarage ...	1·18	,,	Killarney, Woodlawn ...	1·55
,,	Cheadle, The Heath Ho.	1·36	,,	Caher, Duneske	1·11
,,	Worcester, Diglis Lock	·73	,,	Ballingarry, Hazelfort...	1·02
,,	Coventry, Coundon	1·67	,,	Limerick, Kilcornan ...	·69
VII.	Ketton Hall [Stamford]	...	,,	Broadford, Hurdlestown	1·19
,,	Grantham, Stainby	·95	,,	Miltown Malbay	1·49
,,	Horncastle, Bucknall ...	1·04	XXI.	Gorey, Courtown House	·86
,,	Worksop, Hodsck Priory	1·18	,,	Athlone, Twyford	1·10
VIII.	Neston, Hinderton	·85	,,	Mullingar, Belvedere ...	1·31
,,	Southport, Hesketh Park	1·59	,,	Longford, Currygrane...	1·20
,,	Broughton-in-Furness ...	1·75	XXII.	Woodlawn	1·20
IX.	Ripon, Mickley.....	1·40	,,	Crossmolina, Enniscoe ..	2·39
,,	Melmerby, Baldersby ...	1·36	,,	Collooney, Markree Obs.	1·55
,,	Scarborough, Obs.	1·11	,,	Ballinamore, Lawderdale	1·82
,,	Middleton, Mickleton ...	·85	XXIII.	Lough Sheelin, Arley...	1·24
X.	Haltwhistle, Unthank...	1·08	,,	Warrenpoint.....	1·63
,,	Bamburgh	1·50	,,	Seaforde.....	1·35
,,	Keswick, The Bank.....	1·84	,,	Belfast, Springfield	2·04
XI.	Llanfrechfa Grange	1·03	,,	Bushmills, Dundarave..	1·30
,,	Llandovery	1·42	,,	Stewartstown	1·05
,,	Castle Malgwyn	1·85	,,	Killybegs	2·48
,,	Builth, Abergwesyn Vic.	2·31	,,	Lough Swilly, Carrablagh	...
,,	Rhayader, Nantgwillt ...	2·08			

NOVEMBER, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·17	— 1·49	·43	7	10	50·3	12	25·4	30	7	20
II.		Maidstone (Hunton Court)...	·90	— 2·03	·43	7	6	...	...	...	...	...	...
,,		Strathfieldsaye	1·39	...	·43	9	9	...	...	...	...	...	...
III.		Hitchin	1·10	— 1·58	·48	7	11	50·0	12	20·0	29	15	...
,,		Winslow (Addington)	1·28	— 1·65	·53	7	9	53·0	21	21·0	7	13	20
IV.		Bury St. Edmunds (Westley)	1·15	— 1·40	·41	1	7	49·0	1, 22	26·0	30	..	...
,,		Norwich (Brundall)	1·48	...	·51	14	13	50·4	12	24·2	30	8	23
V.		Weymouth(LangtonHerring)	·76	— 2·90	·35	14	8	51·5	12	27·0	30	8	...
,,		Torquay (Cary Green)	·84	...	·62	14	6	54·4	21	31·0	7	1	13
,,		Polapit Tamar [Launceston]..	1·79	— 2·55	·71	14	12	56·0	19	22·0	4	16	21
VI.		Stroud (Upfield)	·94	— 2·39	·48	14	7	48·0	12	25·0	29	13	...
,,		ChurchStretton(Woolstaston)	1·27	— 2·25	·40	7	14	50·5	11	22·0	30	11	...
,,		Tenbury (Orleton)	·97	— 2·17	·34	14	9	51·3	20	18·8	6	12	18
VII.		Leicester (Barkby)	1·13	— 1·16	·54	7	10	51·0	12	17·0	5	22	27
,,		Boston	·83	— 1·37	·40	7	8	50·0	5	26·0	6	12	...
,,		Hesley Hall [Tickhill].....	1·18	— ·84	·60	7	11	51·0	11	20·0	30	8	...
VIII.		Manchester(PlymouthGrove)	1·14	— 1·86	·53	7	10	52·0	12	23·0	5	14	14
IX.		Wetherby (Ribston Hall) ...	1·16	— ·91	·49	8	7	...	...	...	...	...	...
,,		Skipton (Arncliffe)	2·16	— 4·59	·81	14	10	..	...	...	...	...	...
,,		Hull (Pearson Park).	1·41	— ·60	·49	7	11	50·0	1*b*	23·0	30	8	15
X.		Newcastle (Town Moor)	1·68	— ·72	·36	15	15	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	4·28	—10·51	1·13	14	11	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·18	— 3·73	·72	14	11	...	...	...	...	...	...
,,		Haverfordwest	1·92	— 3·94	·71	14	14	52·5	18	23·9	5	14	22
,,		Aberystwith (Gogerddan) ...	1·83	— 3·28	·85	7	9	51·0	12	...	...	...	...
,,		Llandudno.....	1·04	— 2·05	·42	7	8	55·5	11	30·4	30	...	...
XII.	SCOTLAND.	Cargen [Dumfries]	1·08	— 3·48	·26	14	8	52·8	12	22·0	30	11	...
,,		Jedburgh (Sunnyside).....	·88	— 1·62	·21	27	10	51·0	12	20·0	30	10	...
XIV.		Colmonell	2·55	...	1·19	14	11	...	...	19·0	30	...	...
XV.		Lochgilphead (Kilmory).....	3·99	— 3·30	·88	14	15	...	...	24·0	3	9	...
,,		Mull (Quinish).....	4·92	— 2·07	·91	14	18	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·20	— 2·76	·30	14*a*	7	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	·75	— 1·95	·20	18	10	55·2	11	26·2	4	6	...
XVII.		Braemar	1·14	— 3·44	·20	6, 13	11	53·0	22	18·0	30	7	18
,,		Aberdeen (Cranford)	1·38	...	·34	14	19	56·0	22	22·0	30	10	..
,,		Cawdor (Budgate)	1·24	— 1·61	·73	6	10	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	1·53	— 5·03	·50	7	6	...	...	...	...	...	...
,,		Glencarron Lodge.....	6·67	...	1·48	9	20	52·0	22	26·6	30	4	...
XIX.		Dunrobin	1·68	— 1·15	·80	6	8	56·5	23	30·0	8, 9	5	...
,,		S. Ronaldsay (Roeberry).....	2·35	— 1·07	·42	9	18	51·0	22	34·0	7	0	...
XX.	IRELAND.	Darrynane Abbey.....	1·94	...	·70	17	15	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	1·24	— 2·43	·30	30	10	53·0	12*c*	25·0	10	8	...
,,		O'Briensbridge (Ross)	1·15	...	·44	17	8	..	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	·93	— 2·13	·45	14	8	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	·66	— 2·17	·19	14	9	54·0	22	26·2	6	5	14
XXII.		Ballinasloe	1·28	— 2·63	·32	13	13	53·0	22*d*	22·0	6	15	...
,,		Clifden (Kylemore)	3·31	...	·95	17	13	...	...	...	...	.	...
XXIII		Waringstown	1·02	— 2·08	·26	17	11	54·0	12*e*	24·0	8	12	19
,,		Londonderry (Creggan Res.).	1·32	— 3·20	·40	14	12	...	...	...	...	...	...
,,		Omagh (Edenfel)	1·35	— 2·52	·41	14	11	52·0	22	23·0	5	11	14

+Shows that the fall was above the average ; —that it was below it.

a—and 18. *b*—and 11, 22. *c*—and 14. *d*—and 23. *e*—and 21.

METEOROLOGICAL NOTES ON NOVEMBER, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

ADDINGTON.—Only three times during the last 26 years has a smaller rainfall been recorded—viz., in 1871, 1879 and 1889. Foggy only on 7th, 14th and 24th.

BURY ST. EDMUNDS, WESTLEY.—The month was more like March than November, dry easterly winds prevailing. Bar. very high on the 5th, 10th, and from the 21st to the 26th. Favourable for agriculture.

NORWICH, BRUNDALL.—R about half the average. Mean temp. 1°·5 below average. The highest reading of the month is the lowest for many years, and 10° lower than on some days in Nov., 1895. Bar. generally high, and the mean for the month about a quarter of an inch higher than the average. Fog on 14th.

WEYMOUTH, LANGTON HERRING.—A fine, dry, cold month. Mean temp. at 9 a.m. (39°·2) is 5°·2 below the average. For the first time in 25 years the max. temp. in Nov. has been below 52°. The rainfall for the first eleven months of this year—18·66 in.—is the smallest for any corresponding period in 22 years, and only 71 per cent. of the average.

TORQUAY, CARY GREEN.—Rainfall 3·36 in. below the average, the fall for the eleven months, January to November, being 12·11 in. below average. Mean temp. 42°·8, or 4°·5 below average. Duration of sunshine 83 hours 20 minutes, being 21 hours 40 minutes above the average; six sunless days.

POLAPIT TAMAR [LAUNCESTON].—Exceptionally dry and cold, easterly winds prevailing, with the least rainfall for November during 16 years. The total rainfall for the 11 months of the year is 6·86 in. below the average. H on 14th and 15th. Fog on 18th and 22nd. S on 28th.

WOOLSTASTON.—A cold, but seasonable month, sharp frosts on the grass most nights. S fell on 7th. Mean temp. 38°·5.

TENBURY, ORLETON.—A very dry, cold month, the driest November since 1871, and the coldest since 1861, the mean temp. being nearly 5°·5 below the average of 35 years. Severe frost from the 4th to the 7th, and again at the end of the month, and frequently between. Fog on six days. During the past eleven months less than 19 inches of R has fallen, while the average of 65 years is more than 27 inches.

LEICESTER, BARKBY.—A variable month, with deficient rainfall. High winds and bitterly cold weather during the last week. Mean temp. 37°·6.

MANCHESTER, PLYMOUTH GROVE.—The coldest November since observations commenced in 1868, with two exceptions, namely, November, 1871 and 1878. Thick fog on 9th. Dense fog on 4th, 5th, 6th and 17th. Fine autumn weather on the 2nd and 3rd, and the last four days. Mean temp. 38°·5.

ARNCLIFFE.—A very dry month. Rainfall far below the average.

WALES.

HAVERFORDWEST.—A remarkably fine month, with an unusual amount of bright sunshine and many cloudless days. The rainfall was small, occurring principally at night. One of the most frosty Novembers recorded here, most

of the grass readings being very low. Remarkably high readings of the bar. from 19th to 25th, the mercury standing at 9 p.m. on the 24th at 30·589 in. (corrected). Prevailing winds N.E. and E. The severe frost of the last three days has been equalled only in November, 1890; from 28th to 30th the ice was thick enough to bear on shallow ponds.

ABERYSTWITH, GOGERDDAN.—Very dull and damp throughout the month very little sunshine.

SCOTLAND.

CARGEN [DUMFRIES].—The bar. pressure for the month is 1·365 in. above the average for 37 years, and a higher figure has only thrice been registered at this station—in 1867, 1879 and 1889. The rainfall of the month is one of the lowest on record, having been smaller only in 1867 and 1879. The fall for the eleven months of the year is 5·74 in. below the average. The sky was unusually overcast, the hours of sunshine being only 57, while the average is 88. Easterly winds prevailed on 15 days, a somewhat unusual experience at this season. Farm work progressed rapidly. Snow drops commenced to show their points during the last week.

JEDBURGH.—The month was marked by atmospheric quietness; total rainfall is much below the average, and a good deal of frost prevailed, but it did not last long, and country work was not suspended.

COLMONELL.—Rainfall 2·84 in. less than the average for 20 years. Mean temp. 0°·4 below the average.

S. RONALDSAY, ROEBERRY.—A very good month. Mean temp. 43°·6, or 0°·7 above the average of 6 years.

IRELAND.

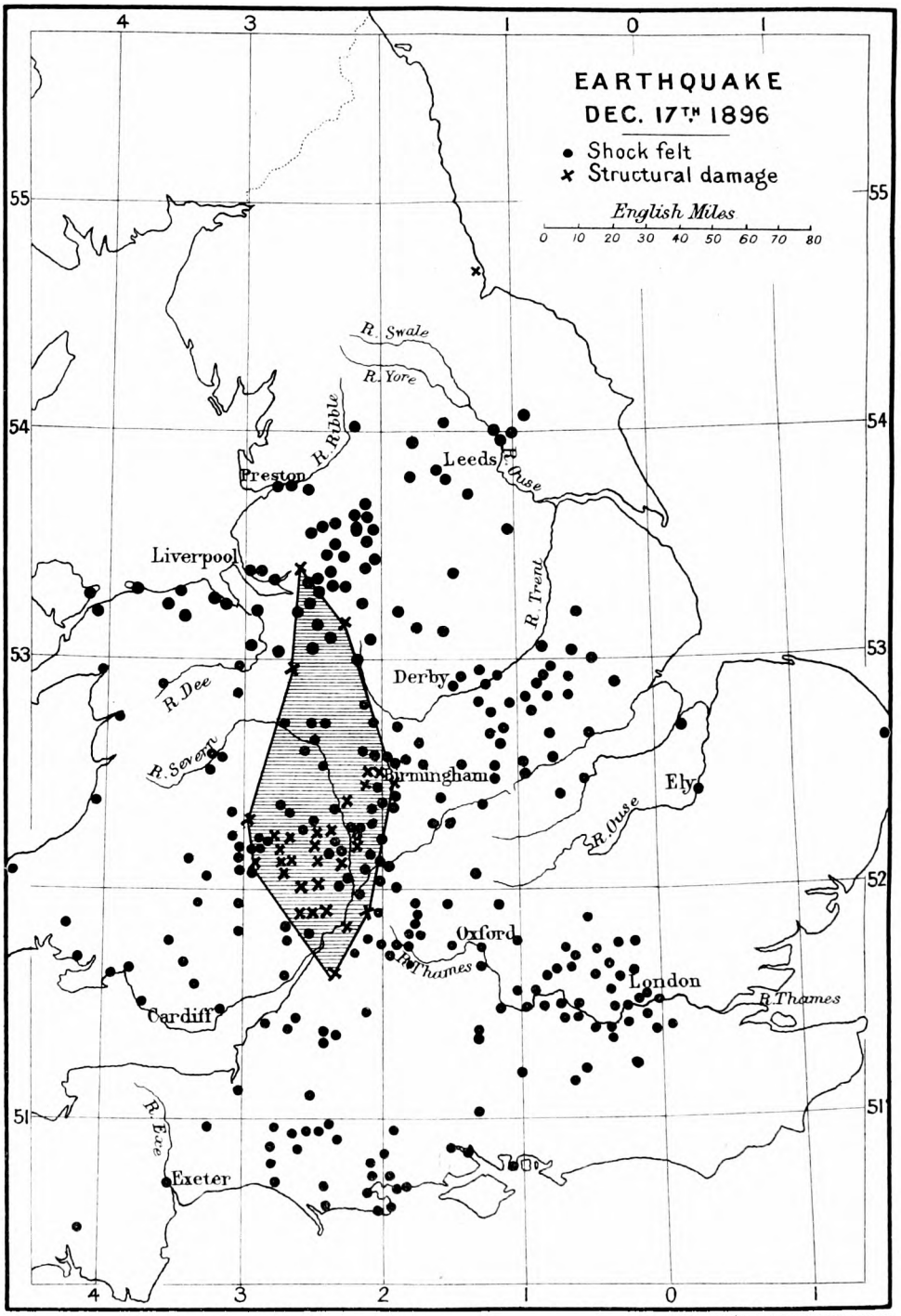
DARRYNANE ABBEY.—A dry month. The first part very fine, but cold, with frost on 4th, 5th and 6th; then mild and showery to the 25th, and cold thence to the end. Narcissus above ground, and some few plants of it in flower early in the month.

WATERFORD, BROOK LODGE.—The driest November since 1879.

O'BRIENSBRIDGE, ROSS.—The finest month of November since 1879, when the rainfall was ·99 in. falling on 10 days.

DUBLIN.—A fine, quiet, rather cold month, and the scanty rainfall established a record for November. The bar. ruled high. Mean temp. 43°·2, or 1°·5 below the average. High winds were noted on seven days, and attained the force of a gale on the 5th and 28th. Foggy on 4th, 5th, 6th, 9th, 16th, 17th, 22nd and 24th. Lunar halos were seen on the 13th and 19th; solar halos on the 4th and 9th.

OMAGH, EDENFEL.—The driest November, or rather that with the least rainfall, since records commenced here in 1864, but the saturation of the atmosphere was frequently so great as to produce a measurable quantity of water in the gauge. It was, however, a seasonable month, with no frost sufficient to interrupt its suitability for farm labour.



STANFORD'S GEOG^L ESTAB^T LONDON.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCLXXII.] JANUARY, 1897. [PRICE FOURPENCE, or 5s. per ann. post free.

THE EARTHQUAKE OF DECEMBER 17TH, 1896.

DR. Davison (of 373, Gillot Road, Birmingham) having announced his intention to prepare a memoir upon the above, we purpose passing on to him all the materials which we have collected, or which may be sent to us.

But it would hardly be appropriate that the greatest English earthquake (except the Colchester one) of modern times should not be noticed in these pages.

We, therefore, proceed to give a few salient features, and also our impressions about them—impressions which possibly the thorough discussion, when completed, may show to be unfounded—but of course we do not expect such a result.

For much of the information upon which this article is founded we are indebted to newspapers, and we are fully aware that many persons regard such a source as unsatisfactory. There are, of course, differences in reporters, but we have had exceptional opportunities for verifying newspaper statements, and believe that, judiciously used, they are very valuable. Besides upwards of 400 such reports, we have many from our own correspondents, and it is on this combined mass of material that these remarks are based.

We begin by indicating the wide area over which the shock of 1896 was felt, and the inner area where it was most violent, as shown by damage to buildings (structural damage). These data are shown by the accompanying map, whence we see that it was felt at points as wide spread as Tavistock and Yarmouth; Weymouth and Hartlepool;* Reigate and Beaumaris—and perhaps beyond these limits. Apparently the area affected was 350 miles in diameter, or one of about 100,000 square miles. Nearly central in this there seems to be an elliptical area of about 130 miles, from N. to S., say from Tortworth (Gloucester) to Manchester, and of a greatest breadth of 40 miles, near the latitude of Birmingham, within which structural damage was produced. This area would be nearly 4,000 square miles,—but the chief damage occurred in the southern portion, including parts of the counties of Hereford, Gloucester and Worcester.

* Perhaps this should be Malton—we are not sure that the disturbance at Hartlepool about 5.0 a.m. had any connection with the earthquake.

We think that there is evidence that this shock was one of a series which can be traced for 600 years, but we give the facts and some little sketch maps, and leave our readers to draw their own conclusions.

1248. December 21st. "A little before sunset an earthquake at Bath and Wells, which shook and cast down several high buildings."—*Short's Hist. of Weather*, 1749, *I.*, *p.* 145.

"Foure dayes before Christmas was a great earthquake in Englande, so that the toppes of houses were shaken and throwne downe, wals did cleave, and the heads of chimnies and towers were shaken, but the bodies and foundations stirred not."—*Stowe*, *p.* 188.

"The Cathedral of Wells was much injured."—*Matthew Paris*, V., p. 46.

"The tower of Wells Cathedral thrown down. Cathedral of St. David's partially destroyed, and many churches in Somersetshire damaged."—Meldola & White's *East Anglian Earthquake*, 1885, page 5.

1574. February 26th. "Between 5 and 6 p.m. York, Worcester, Gloucester, Bristol, Herefordshire, and neighbouring counties. Plates and books thrown down at Tewkesbury; Ruthen Castle partly destroyed; Bell in Denbigh market place sounded twice, and several chimneys thrown down. People kneeling in Norton Chapel (near Gloucester?) were almost all thrown down."—*East Anglian Earthquake*, p. 5.

1705. "Extended from Leeds to Bristol, and from Norwich to Liverpool; subterranean noise."–Roper's *Earthquakes*, 1889.

1863. October 6th, about 3.22 a.m. The outside limits indicated by the places mentioned are Dublin, Ulverstone, Scarborough, Market Rasen, Peterborough, Bury St. Edmunds, London, Brighton, I. of Wight, Dorchester, Plymouth, Wicklow, Dublin. The only places at which structural damage occurred, were Ross, Hereford; Worcester, and Congleton.—E. J. LOWE, F.R.S., in *Proceedings Met. Soc.*, 1864, II., p. 55.

1868. October 30th, 10.35 p.m. Outside limits, Blackpool, Nottingham, London, I. of Wight, Tavistock, Bodmin, Pembroke, Lampeter, Blackpool. No structural damage reported and shock feeble."—*Met. Mag.*, 1868, III., p. 153.

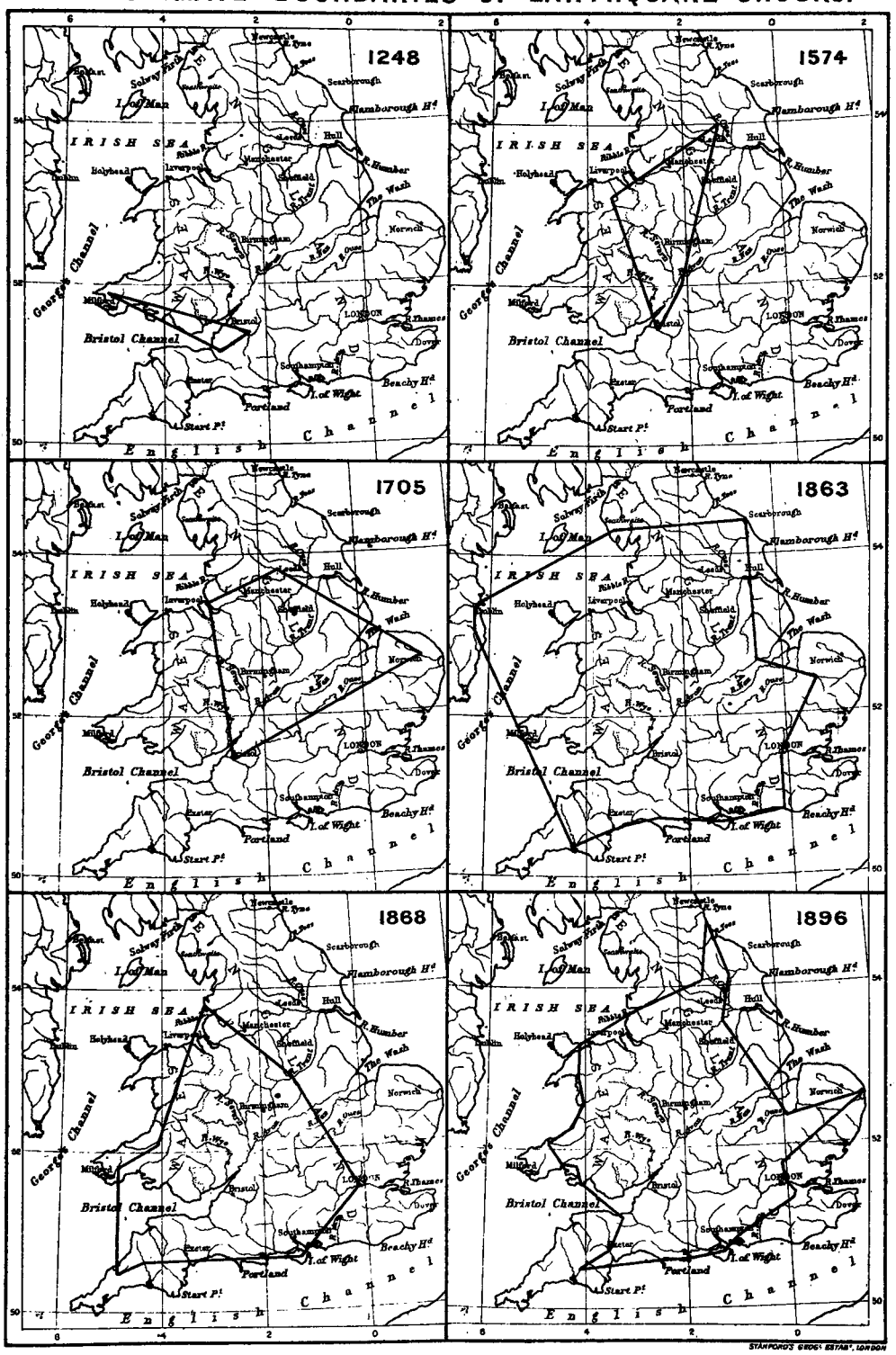
1888. April 11th, 7.10 p.m. Very slight, but felt at Oswestry, Dolgelly, Llangollen and Rhiwbrifdir.—*Meteor. Mag.*, 1888, XXIII., pp. 64, 73.

1892. August 18th, 0.24 a.m. Felt in S.E. of Ireland, all Wales, and in Cornwall, Hereford and Worcester. Damage slight.—*Meteor. Mag.*, 1892, XXVII., p. 113.

1893. November 2nd. Very similar to the shock of 1892.—*Meteor. Mag.*, 1893, XXVIII., p. 152.

The details for 1896 have already been given, and the set of small maps needs no explanation.

APPROXIMATE BOUNDARIES OF EARTHQUAKE SHOCKS.



The similarity in the area affected by these shocks seems to us very remarkable. Every place mentioned in 1574 is among those whence we have reports for 1896, and not one of them is outside the 1896 area; and the agreement between the areas of 1863, 1868, and 1896 is extremely close.

As regards violence, and for that district, 1248 seems to have been the worst, next to it 1896, then 1705, 1863, and least of all 1868.

Compared with the Essex shock of April 22nd, 1884, the pecuniary damage in 1896 is much less; but it is spread over an area ten times as great as that to which the 1884 damage was limited; 4,000 square miles against 400.

OBSERVERS' NOTES ON THE 1896 EARTHQUAKE.

MIDDLESEX.

London.—Bartholomew Villas, N.W. Shock felt, time 5.35 a.m. R. INWARDS.

Lower Edmonton.—Jugs rattled more than they could be made to do by walking near them, time 5.35 a.m. PERCY M. BEAREY.

SURREY.

Guildford.—Slight shock felt about 5.45 a.m. M. L. C. MATHEW.

Yorktown.—Was awakened by the shock. T. K. BISHOP.

HERTS.

St. Albans.—Was awake, and felt the shaking begin quite suddenly, continue perhaps half-a-minute, and then as suddenly stop; time within a minute or two of 5.30 a.m. E. A. ORMEROD.

Kensworth.—Furniture, crockery, &c., shaken, at 5.35 a.m. S. GRACE JONES.

BUCKS.

Slough, Upton.—Shock very perceptible. R. BENTLEY.

Slough, Fulmer.—House shook very much, and the pictures on the walls rattled. C. B. FOSTER.

Winslow, Addington.—Shock felt. J. MATHISON.

OXFORD.

St. Giles's.—Shock felt about 5.30 a.m. ELEANOR M. TAWNEY.

NORTHANTS.

Castle Ashby.—Sleepers were awakened by a rumbling noise, like that of a heavily laden waggon, which was followed immediately by a distinct shaking of beds and furniture, about 5.30 a.m. R. G. SCRIVEN.

Pitsford, Sedgbrook.—Shock felt and furniture rattled at 5.34 a.m. C. A. MARKHAM.

Duddington [*Stamford*].—A rumbling sound like that of a traction engine, or furniture being moved, preceded the shock, which threw down a small clock. F. COVENTRY.

HUNTS.

St. Neots, Great Paxton.—Three inmates of the vicarage, in different rooms, felt a shock at 3.30 a.m., and that at 5.30 a.m. was not felt. A. G. CANE.

DORSET.

Langton Herring.—Shock felt distinctly about 5.35 a.m., apparently going from E. to W., and lasting five or six seconds. C. H. GOSSET.

SOMERSET.

N. Cadbury.—Shock much like many I have felt in Patras, apparently going towards S.W., time about 5.32 a.m. H. A. BOYS.

GLOUCESTER.

Bristol, Over Court.—Was awakened by shock which seemed to be shaking the house, and was accompanied by noise, in a second or two it seemed as if the S.E. corner of the house was falling in ruins on the gravel, but daylight showed no injury. R. C. CANN LIPPINCOTT.

Stroud, Upfield.—Distinct shock about 5.30 a.m. ROSE E. STANTON.

Cheltenham (Naunton Park Villas).—The shock occurred about 5.34 a.m., and lasted about 5 secs., direction apparently N.—S. It was preceded by a heavy rumbling noise, and some persons who were awake maintain that they saw a brilliant flash of lightning. My bed was shaken violently, furniture and crockery shook and rattled, and the house bells rang, but no structural damage occurred. W. LLEWELLYN EVANS.

Tewkesbury (Beckford).—Sharp shock at 5.34 a.m.—only one shock, but it lasted 6 or 7 seconds. My bed rocked about as much as a railway carriage going at full speed. The shock was preceded a second or two, and accompanied, by a rumbling not like thunder but more in the earth, somewhat resembling that made by a train passing a wide-span girder-bridge. Doors, pictures, and crockery shook and rattled. F. SLADE.

HEREFORD.

Ross, The Graig.—The most severe shock remembered here, occurred about 5.33 a.m., lasting 8 or 10 secs., and caused some loose chimneys to fall. It was accompanied by a loud rumbling noise like that of a traction engine, steam roller, or motor car. H. SOUTHALL.

SALOP.

Bridgnorth, Quatford House.—I was awoke at 5.31 a.m. by a shaking and by a rumbling sound, which I think lasted about 6 secs. A labourer who works for me has just told me that last night a tumbler was left upside-down on a table, this morning it was found in the same position but with the bottom cut clean off! T. MAYO.

Church Stretton, Woolstaston.—Two shocks were felt here, the first slight, the second at 5.30 a.m. very severe and accompanied by a loud rumbling sound, like a heavy waggon. Furniture and crockery violently shaken. E. DONALD CARR.

Wem, The Clive Vic.—Shock at 5.35 a.m., with lightning, causing crockery to rattle, and making game and other birds crow and cry. J. COOPER WOOD.

WORCESTER.

Malvern.—I was awakened by my bed oscillating and the fire-irons rattling for several seconds; there was also a rumbling noise; time a little before 5.35 a.m. C. S. PRINGLE.

Orleton.—Severe shock about 5.37 a.m. T. H. N. DAVIES.

LEICESTER.

Barkby.—Considerable shock at 5.35 a.m. E. N. POCHIN.

LANCASTER.

Garstang, Bruna Croft.—At, or about, 5·35 a.m., having been awake about ten minutes, I heard the water jug, full of water, shake in the basin, and the window rattle slightly, this went on for some six to ten seconds.

I immediately said, "Why that must be an earthquake," because though trains three-quarters of a mile distant sometimes make the windows rattle, they never affect the water jug. SYDNEY WILSON.

Garstang, Elswick Lodge.—Slight shock between 5.30 and 5.35 a.m. S. KING.

MONMOUTH.

Llanfrechfa.—Slight tremors about 5.30 a.m., and noise as of a heavy waggon on a hard road. F. J. MITCHELL.

CARMARTHEN.

Llandovery.—Shock felt about 5.40 a.m. J. WATKINS.

PEMBROKE.

Haverfordwest.—Slight shock about 5.30 a.m. E. P. PHILLIPS.

MERIONETH.

Rhiwbrifdir.—Shock felt about 5.30 a.m. R. ROBERTS.

CARNARVON.

Llanystumdwy, Talavor.—Shock about 5·35 a.m. J. ROBERTS.

Llandudno.—Slight shock about 5.30 a.m. J. NICOL.

TIME.

Here, as in every previous earthquake, there is ample proof of the carelessness of most persons as to keeping accurate time, and of the tendency to quote round figures (*e.g.*, 5.30 or 5.40) rather than accurate ones.

It will be for Dr. Davison, if he can, to bring order out of chaos; meanwhile we offer the following as our impression of what was the initial time of the disturbance—viz., 5.32 a.m.—and the rate of progress, 30 miles per minute from Hereford as a centre.

The following records* all agree with the above conditions within one minute :—

Within 30 *miles of Hereford,* 5.32 *a.m.*

Glasbury, Radnor, A. Battiscombe 5.33	Monmouth, Monmouth, C. H. Culley 5.32
Hereford, Hereford, W. Pilley 5.32	Ross, Hereford, H. Southall 5.33
Kinnersley, ,, *Press* 5.33	Tewkesbury, Gloucester, Rev. E. H. Cosens 5.32
Ludlow, Salop, *Press* 5.32	Worcester, Worcester, *Nature* 5.31

30 *to* 60 *miles from Hereford,* 5.33 *a.m.*

Bath, Somerset, Rev. H. H. Winwood 5.32	Cardiff, Glamorgan, A. Mee 5.32
N. Cadbury, Somerset, Rev. H. A. Boys 5.32	Cheltenham, Gloucester, Rev. M. A. Smelt 5.33
Birmingham, Dr. Davison 5.32½	,, W. Ll. Evans 5.34
Bristol, Gloucester, *Press* 5.34	Kidderminster, Worcester, *Press* 5.32
	Neath, Glamorgan, Signalman 5.33

* Of course, it may be said that by selecting your figures you can prove anything. We admit the general proposition, but are sure that in this case it does not apply, because nearly all the best observers appear in this list. It would be invidious to set out their qualifications, but there is the Director of Kew Observatory, there are several Fellows of the Royal Astronomical and Royal Meteorological Societies, and—to our mind, strongest fact of all—there are the only railway signalmen whose reports we have seen, men who were bound to be awake, bound to have their clocks right, and bound to record time accurately by day and by night.

60 *to* 90 *miles from Hereford*, 5.34 *a.m.*

Barkby, Le'ster, Rev E. N. Pochin 5.35
Derby, Derby, *Press* 5.33
,, ,, ,, 5.34
Dunton Bassett, Leicester, Rev. A. Chiswell 5.34
Leicester, Signalman 5.34
Oxford, Oxford, *Press* 5.35
Sedgbrook, Northants, C. A. Markham 5.34
Talarvor, Carnarvon, J. Roberts 5.35
Whitchurch, Salop, *Press* 5.35
Witney, Oxford, *Press* 5.35

90 *to* 120 *miles from Hereford*, 5.35 *a.m.*

Attercliffe, Yorks, *Press* 5.35
Bolton, Lancashire, W. W. B. Hulton 5.35
,, ,, W. W. Midgley 5.35
Chorlton-cum-Hardy, H. Whale 5.35
Didsbury, Lancashire, *Press* 5.35
Edgeware, Middlesex, Judd 5.35
Hitchin, Herts, *Press* 5.35
Kensworth, Herts, J. Jones, 5.35
Kew Obsy., Surrey, Dr. Chree 5.35
Manchester, *Press* 5.36
Manchester (St. Bede's), Rev. L. C. Casartelli 5.35
Melton Mowbray, Le'ster, *Press* 5.35
Pinner, Middlesex, F. H. Mabbett 5.34
Preston, Lancashire, Dr. Brown 5.35
Watford, Herts, Dr. Attfield, F.R.S. 5.34
Weymouth, Dorset, Rev. C. H. Gosset 5.35
Wilmslow, Cheshire, W. Mann 5.35

120 *to* 150 *miles from Hereford*, 5.36 *a.m.*

Castleford, Yorks, *Press* 5.36
Dulwich, Kent *Press* 5.37
Edmonton, Middlesex, P. M. Bearey 5.35
Garstang, Lancashire, S. Wilson 5.35
Hellifield, Yorks, Signalman 5.35
Leeds, Yorks, *Press* 5 35
London (City), E. Lionel Scott 5.35
,, (Highbury), C. Nicoll 5.35
,, (Kentish Town), R. Inwards 5.35
Nutfield, Surrey, H. Nicholls 5.37
Wisbech, Cambridge, A. Peckover 5.35

Minor Shocks.

Prof. Milne's seismometer shows tremors for several hours before the great shock, and he has asked whether anyone felt shocks during those hours. We submit a few records without guaranteeing their accuracy, because they may indicate where inquiry should be made.

2.10. *Evesham, Worcester.*—"Two shocks; (1), 2.10 a.m.; (2), 5.40 a.m."

3.0. *Clifton-on-Teme, Worcester.*—"A few inhabitants were startled by a slight earthquake at 3 a.m.; at 5.30 there was a severe one."

3.15. *Much Wenlock, Salop.*—"Slight shock 3.15, and violent one at 5.35."

3.50. *Malvern, Worcester.*—"A shock is said to have been felt at 3.50 a.m."

3.50. *Malvern, Worcester.*—"I got up at the first shock at 3.50, thinking that some one had knocked."—J. G. Powell, Coombe Lodge.

4.0. *Wolverhampton.*—"Two shocks, one about 4 a.m., the other an hour later."

4.15. *Droitwich, Worcester.*—"Slight shock at 4.15; very severe at 5.35 a.m."

4.20. *Droitwich, Worcester.*—"Shock at 4.20, slight."

4.30. *Cardiff.*—There seem to have been two shocks, one about 4.30, and the other an hour later."

5.0. *Whitchurch, Salop.*—"Two shocks; one at 5.0, the other more severe at 5.37."

5.50. *Dulwich, Surrey.*—"About ¼ hour after the great shock, there was another, very slight."

5.57. *Southampton.*—"Two shocks here; (1), 5.40; (2), 6.3. [As his first time shows his clock to be 6 m. fast, we have entered the second shock as 5.37.]"

Luminous Phenomena.

We do not think that the evidence upon this head proves more than that there was a local thunderstorm at about the same time as the shock. We accept no responsibility for the following statements, but give all that we have seen, and leave our readers to determine their value.

Kinnersley, Herefordshire.—"There was noticed to be a very clear light during the time the shock was on."

Bridgnorth, Salop.—"Previous to the disturbance the streets seemed to be on fire!"

Wem, Salop.—"Shock at 5.35 a.m., with lightning."—J. Cooper Wood.

Evesham, Worcester.—"Directly the vibration ceased, a brilliant light appeared in the sky, and this continued for an appreciable time."

Evesham, Worcester.—"A few persons state that at the time of the shock there was apparently a flash of lightning."

Kidderminster, Worcester.—"The shocks were preceded by a luminous flash lighting up the northern sky."

Worcester.—"Alderman Price believes that there was a flash of lightning at the time, and others confirm this."

Liverpool.—"There was a heavy thunderstorm, accompanied by vivid lightning and terrific hail, followed by an earthquake."

Liverpool.—"A thunderstorm followed the earthquake in about 15 minutes."—F. W. Saxby, 42, Lidderdale Road.

Manchester.—"Several men who were setting out for their work at Stretford, state that they saw a red light in the sky, in the direction of Warrington; they heard no sound, but thought that some chemical works must have been blown up."

Warrington.—"The earthquake here at 5.35 was preceded by a loud clap of thunder at 5.30 a.m."

Widnes.—"The earthquake was followed by a thunderstorm."

Malton, Yorks.—"At 5.30 a.m. I was driving from Terrington to Welburn, and when south of Brandreth Farm, near Bulmer, both my groom and I saw a sudden flash of light veiled in the fog, which I at first took to be lightning, but afterwards concluded to be the reflection from a meteor. . . . Is it possible that we were at the edge of the disturbance, and that the flash of light was part of the lightning of the thunderstorm experienced in the vicinity of Widnes and Liverpool?"—John Dougall, M.D., The Grange, Welburn, York.

Knighton, Radnor.—"People out of doors say that there was a great flash of lightning at the time, which fairly lighted up the place."

Newtown, Montgomery.—"A shock of earthquake was felt here, after a stormy night, with vivid lightning."

Rhyl, Flint.—"The shock was followed by a hail storm."

Ruthin, Denbigh.—"The driver of the mail coming through Llanbedr at the time [of the shock] reported thunder and lightning.

SOUND.

It is, we believe, denied that any sound is produced by an earthquake. We could quote 200 reports of sound in connection with the present one, but we should probably be told (1) that persons suddenly awakened are not competent recorders of physical phenomena, (2) that the noise may be accounted for by the creaking of the timbers of houses when they are being shaken.

We quote some statements by persons who were awake, and who heard noise before they felt anything.

Father Vincent McNabb, who was standing in his room at the Dominican Priory, Woodchester, Stroud, says: "After a distant sound, I noticed slight trembling of the walls and floor. Sound and motion increased in volume until I thought that some heavy cart was rumbling over the tiled cloister."

A Tewkesbury correspondent says: "I was lying awake when I heard a distant rumbling, the sound getting nearer and nearer, till it felt like a traction engine close by."

Mr. Walter Pilley, of Hereford, who was just going out, says: "At 5.32 a.m. I heard a peculiar rumbling noise, as of a traction engine, then followed two terrific crashes, the second appearing to be louder than the first; succeeding this, the house seemed to be lifted and rocked."

An observer at Eardisley, Hereford, distinctly differentiates, in the following words, the noise of the earthquake, and that of the straining of the house: "The rumbling noise lasted about 3 secs., and terminated with a sudden shock, which made the beams of the house creak and the windows rattle."

From Ledbury we hear: "Its first warning was a noise as of a sudden rising of the wind, which during the night had been unusually quiet; this noise increased with great force, and was immediately accompanied by a tremendous shaking of houses, &c."

The following letter is self explanatory.

To the Editor of the Standard.

SIR,—In a Leading Article in *The Standard* of Friday last, relating to the late earthquake, you state that "Several correspondents of a class accustomed to observe accurately, and who may be assumed to record their observations without exaggeration, distinctly assert that the tremors were neither preceded nor accompanied by any unusual noise." I may say that, in this district at any rate, the shock was announced by a loud rumble, not unlike the sound of a fast train passing close to the house of the observer. The sound awoke me, and was heard by two more of the family. This rumble was immediately followed by a violent shaking of the premises, which lasted about 20 secs.—I am, Sir, your obedient Servant,

R. V.

Little Hereford, Tenbury, December 20th.

The report from Ludlow is—"The approach of the shock was indicated by a loud rumbling noise, which grew louder, and then there was a severe shaking of the earth."

We have many similar statements, but we will give only one more—the graphic, characteristic, and, as regards the sound, apparently unanswerable statement of Father Ignatius as to the occurrence at Llanthony Abbey, Abergavenny, Mon. "This morning [*i.e.*, before he could have received outside information.—ED.], while our community were in church between 5 and 6, at the usual morning service, very strange phenomena startled us all. 'Suddenly there came a sound as of a rushing mighty wind,' and then twice 'the place was shaken where they were assembled together,' the whole lasting about 8 secs. There was no feeling, but only 'the sound of a mighty rushing wind.' There was no rumbling underground, but the whole massive building and everything in it swayed violently twice. I at once ordered everyone to leave the building. . . . . The remarkable portion of the experience was the rushing sound in the air that preceded the shocks. It seems that there must have been some tremendous body of meteors rushing through the air, and then, coming in contact with the ground, they produced the shocks."

REVIEWS.

Die Beurtheilung des Wetters auf mehrere Tage voraus. von Dr. W. J. VAN BEBBER. Sm. 8vo. Stuttgart: F. Enke, 1896. 52 pp., 8 maps.

AN interesting and popularly written paper upon the possibility of forecasting the weather for "several days," instead of, as is now done by most Government establishments, for "one day."

This is not the place to discuss the amount of success which attends the official forecasters; and Dr. van Bebber will at once admit that his "several days'" forecasts must of necessity be less certain of fulfilment than those for "one day."

Assuming, however, that the ordinary "one day" forecasts are a success, evidently "several days" forecasts which approach success would be very useful.

Dr. van Bebber has had long experience of the ordinary system, and has studied, probably as carefully as anyone, the normal paths of depressions across Europe; he thinks that those studies prove that these paths can be anticipated, and of course, if so, then the weather for "several days" can be foretold.

We hope that it is so; but our impression is that if Dr. van Bebber instead of living at Hamburg had lived at Valencia, his views would have been somewhat less firmly held.

On a Whirlwind at Bloxworth [*Dorset*], by the Rev. O. PICKARD-CAMBRIDGE, M.A., F.R.S. (Proc. Dorset Natural History and Antiquarian Field Club). 8vo. Dorchester, 1896. 4 pp., 3 plates.

AN excellent account of the damage wrought by a whirlwind on the night of November 10th, 1895. It is illustrated by a map on the scale of five inches to a mile, and by two photo-blocks of the wrecked trees. The track was S.W.–N.E., about a mile long, and from 80 to 100 yards in breadth.

Round the Year: a Series of short Nature Studies by PROF. L. C. MIALL, F.R.S. London: Macmillan & Co., 1896, sm. 8vo., 295 pages.

THIS is the most Gilbert-Whitish book that we have seen for a long time. Like "The Natural History of Selborne" it is chiefly devoted to notes on animal and vegetable life; but, like it, running off into bits of meteorology, fogs, snow and snow crystals, underground temperature, &c. The parallelism between the two writers is so great that we are surprised that Crag Foot does not appear as Selborne does, among the list of rainfall stations.

To those who have eyes to see, and desire to know something of the world in which they live, and who wish for an able and cheerful companion, we say, "Read *Round the Year.*" The book is so fascinating to lovers of nature that they will feel great reluctance to lay it down before they have read to the end.

CIEL ET TERRE.

WE congratulate M. Lancaster and his co-Editors of *Ciel et Terre* upon obtaining a unique distinction.

M. Mailly was a member of the staff of the Royal Observatory of Bruxelles, and also a member of the science section of the Royal Academy of Belgium; he died in October, 1891, and left 10,000 francs (£400) to the Royal Academy to found a prize to be awarded to the Belgian who had made some astronomical discovery, or had contributed to the progress of astronomy in the country.

The Royal Academy accepted the legacy, founded the "Mailly prize" of 1000 francs (£40), to be granted each four years, and on December 15th, 1896, awarded the first prize to the Editors of *Ciel et Terre.*

RAINFALL AT OVINGTON, ENNERSDALE, NATAL.

Lat 29° S. Lon. 29½° E. Altitude 3715 ft. ?

By the Rev. A. H. Stocker.

	Monthly Depth.					Number of Wet Days.					Averages for 5 Years.	
	1891 to 1892	1892 to 1893	1893 to 1894	1894 to 1895	1895 to 1896	1891 to 1892	1892 to 1893	1893 to 1894	1894 to 1895	1895 to 1896	Rain.	Days.
	in.	in.	in.	in.	in.						in.	
July	·20	·07	·19	—	—	3	1	3	—	—	·09	1
Aug.	·11	1·70	·33	·71	·11	6	5	4	5	2?	·59	5
Sept.	·56	2·94	5·64	2·46	·83	6	7	13	7	3	2·49	7
Oct.	3·50	6·00	4·75	1·13	·79	16	19	15	10	4	3·23	13
Nov.	1·78	4·18	*12·05*	3·54	3·08	15	12	16	11	9	4·93	13
Dec.	5·57	3·06	6·10	3·19	7·97	16	8	18	16	18	5·18	15
Jan.	3·46	6·84	9·21	3·25	4·93	12	20	14	18	12	5·54	15
Feb.	4·10	4·06	4·66	6·96	7·33	14	12	10	12	14	5·42	12
Mar.	3·24	4·56	2·68	5·00	1·83	17	17	13	17	9	3·46	15
April	1·18	1·34	2·68	·54	3·26	6	4	7	8	8	1·80	6
May	·47	·14	·71	·27	·79	7	2	8	4	2	·48	5
June	—	·06	·25	—	·71	—	1	2	—	2	·20	1
	24·17	34·95	49·25	27·05	31·63	118	108	123	108	83	33·41	108

Note.—In 1895 there was an absolute drought for 92 days, from May 20th to August 19th ; and in 1896 one for 52 days, from June 17th to August 7th.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JULY, 1896.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	88·7	14	47·7	2, 29	77·5	55·2	52·6	65	133·0	41·1	1·03	7	...
Malta	103·0	19	63·3	1	87·7	69·0	65·6	66	150·7	58·1	·00	0	1·5
Mauritius	75·4	1	57·0	5	72·9	62·9	58·5	74	123·7	46·6	1·82	20	5·1
Calcutta	91·9	1	77·5	21	88·4	79·3	78·5	87	158·8	76·3	12·08	19	8·5
Bombay	87·6	6	75·1	21	84·2	77·6	76·6	87	137·9	70·2	36·44	31	9·3
Ceylon, Colombo	88·4	6	73·5	25	86·6	78·2	75·4	85	155·0	71·5	2·85	10	7·0
Melbourne	61·0	3	32·9	31	54·1	42·4	41·2	77	109·5	23·0	2·00	18	5·8
Adelaide	68·4	3	34·4	10	58·6	42·1	41·4	75	124·2	26·4	1·26	18	6·0
Sydney	66·9	5	39·8	2	56·1	43·9	77·0	80	103·0	27·9	2·53	10	3·5
Wellington	59·0	19	36·0	21	54·7	43·9	41·8	75	110·0	23·0	5·83	20	4·5
Auckland	64·0	9	42·0	17	57·9	47·3	44·8	76	119·0	38·0	8·70	30	6·5
Jamaica, Kingston	93·9	13	69·6	1	89·8	74·4	70·4	68	...	...	·99	6	...
Trinidad	92·0	10*a*	69·0	var.	88·2	70·5	73·5	83	174·0	68·0	6·35	22	...
Grenada	85·2	29	70·0	7	82·5	74·4	71·1	81	149·2	...	10·75	28	3·5
Toronto	91·3	12	47·2	16	80·0	59·4	59·3	72	106·0	40·0	2·18	10	5·0
New Brunswick, Fredericton	90·7	2	46·0	18	77·5	54·0	56·8	68	...	...	3·80	10	5·0
Manitoba, Winnipeg	90·5	1	42·7	23	75·9	53·7	...	...	...	...	2·01	11	6·0
British Columbia, Esquimalt	78·2	5	44·2	29	71·2	51·1	54·1	85	...	...	·00	0	3·0

a—and 13.

REMARKS.

MALTA.—Adopted mean temp. 77°·6, or 0°·1 above the average. Mean hourly velocity of wind 7·0 miles. Average temp. of sea 77°·3. TS on 13th. L on 21st.
J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·2, of dew point 0°·9, and rainfall ·48 in., below, their respective averages. Mean hourly velocity of wind 11·4 miles, or 0·4 mile below average; extremes, 26°·4 on 11th, and 2·0 on 1st; prevailing direction, E.S.E. T. F. CLAXTON.

Adelaide.—Mean temp. 1°·2, and rainfall 1·43 in., below the average of 39 years. A dry winter generally, especially in the north, after a dry hot summer.
C. TODD, F.R.S.

Sydney.—Rainfall 1·71 in., temperature 2°·4 below, and humidity 3·3 above, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Generally fine in the early part of the month, with showers at intervals; the latter part very wet. Maximum rainfall on 25th, 1·23 in. Winds throughout light and variable; frequent calms; several frosty nights. T on 14th. H on 19th, and fog on 7th and 21st. Temperature 1°·7 above, and rainfall ·51 in. below, their respective averages. R. B. GORE.

Auckland.—A rainy and stormy month, the total rainfall being nearly three inches in excess of the average of 30 years. Mean temp. slightly above the average.
T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 4·4 miles. Kingston rainfall about half the average. R. JOHNSTONE.

TRINIDAD.—Rainfall 3·10 in. below the 30 years average. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, DECEMBER, 1896.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	5·22	XI.	Lake Vyrnwy	6·21
,,	Birchington, Thor	3·62	,,	Corwen, Rhug	5·08
,,	Hailsham	4·95	,,	Criccith, Talarvor.....	5·76
,,	Ryde, Thornbrough	4·92	,,	I. of Man, Douglas	7·28
,,	Emsworth, Redlands ...	4·34	XII.	Stoneykirk, Ardwell Ho.	5·13
,,	Alton, Ashdell	5·19	,,	New Galloway, Glenlee	7·68
III.	Oxford, Magdalen Col..	3·03	,,	Lilliesleaf, Riddell	4·79
,,	Banbury, Bloxham	3·74	XIII.	N. Esk Res. [Penicuick]	5·85
,,	Northampton, Sedgebrook	3·37	,,	Edinburgh, Blacket Pl..	3·35
,,	Alconbury	2·59	XIV.	Glasgow, Queen's Park..	4·85
,,	Wisbech, Bank House...	3·10	XV.	Inverary, Newtown	8·74
IV.	Southend	2·63	,,	Oban, The Corran	7·70
,,	Harlow, Sheering..... ...	...	,,	Islay, Gruinart School...	2·09
,,	Colchester, Lexden	2·72	XVI.	Dollar.....	5·87
,,	Rendlesham Hall	2·56	,,	Balquhidder, Stronvar...	10·52
,,	Rushall Vicarage	3·51	,,	Ballinluig	6·08
,,	Swaffham	4·01	,,	Dalnaspidal H.R.S.....	8·84
V.	Salisbury, Alderbury ...	5·31	XVII.	Keith H.R.S.....	5·43
,,	Bishop's Cannings	4·04	,,	Forres H.R.S.	2·50
,,	Blandford, Whatcombe .	6·60	XVIII.	Fearn, Lower Pitkerrie..	2·81
,,	Ashburton, Holne Vic...	9·61	,,	N. Uist, Loch Maddy ...	4·94
,,	Okehampton, Oaklands.	8·46	,,	Invergarry.....	7·28
,,	Hartland Abbey	7·14	,,	Aviemore H.R.S.	3·25
,,	Lynmouth, Glenthorne.	7·93	,,	Loch Ness, Drumnadrochit	3·41
,,	Probus, Lamellyn	9·22	XIX.	Invershin	2·45
,,	Wellington, The Avenue	6·09	,,	Scourie	3·60
,,	Wincanton, Stowell Rec.	5·76	,,	Watten H.R.S.....	4·10
VI.	Clifton, Pembroke Road	4·11	XX.	Dunmanway, Coolkelure	12·92
,,	Ross, The Graig	3·47	,,	Cork, Wellesley Terrace	6·47
,,	Wem, Clive Vicarage ...	3·04	,,	Killarney, Woodlawn ...	7·66
,,	Cheadle, The Heath Ho.	4·40	,,	Caher, Duneske	5·87
,,	Worcester, Diglis Lock	2·65	,,	Ballingarry, Hazelfort..,	4·12
,,	Coventry, Coundon	3·60	,,	Limerick, Kilcornan ...	3·60
VII.	Ketton Hall [Stamford]	...	,,	Broadford, Hurdlestown	4·09
,,	Grantham, Stainby	3·96	,,	Miltown Malbay	6·27
,,	Horncastle, Bucknall ...	3·55	XXI.	Gorey, Courtown House	7·82
,,	Worksop, Hodsck Priory	2·55	,,	Athlone, Twyford	5·02
VIII.	Neston, Hinderton	3·07	,,	Mullingar, Belvedere ...	5·86
,,	Southport, Hesketh Park	4·37	,,	Longford, Currygrane...	4·84
,,	Broughton-in-Furness ...	8·49	XXII.	Woodlawn	6·61
IX.	Ripon, Mickley.....	4·15	,,	Crossmolina, Enniscoe ..	7·56
,,	Melmerby, Baldersby ...	3·37	,,	Collooney, Markree Obs.	5·20
,,	Scarborough, Obs.	2·71	,,	Ballinamore, Lawderdale	5·59
,,	Middleton, Mickleton ...	3·85	XXIII.	Lough Sheelin, Arley...	4·31
X.	Haltwhistle, Unthank...	3·84	,,	Warrenpoint.....	6·59
,,	Bamburgh	4·94	,,	Seaforde.....	5·95
,,	Keswick, The Bank	5·67	,,	Belfast, Springfield	5·73
XI.	Llanfrechfa Grange	6·84	,,	Bushmills, Dundarave..	4·22
,,	Llandovery	7·49	,,	Stewartstown	4·34
,,	Castle Malgwyn	9·54	,,	Killybegs	7·52
,,	Builth, Abergwesyn Vic.	12·68	,,	Lough Swilly, Carrablagh	4·54
,,	Rhayader, Nantgwillt ...	10·08			

DECEMBER, 1896.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	3·61	+ 1·54	·75	2	21	51·8	26	26·6	19	12	23
II.		Maidstone (Hunton Court)...	3·15	+ ·91	·70	13	16	...	...	...	...	..	...
,,		Strathfieldsaye	4·75	...	1·04	4	19	...	...	...	...	...	...
III.		Hitchin	3·21	+ 1·18	·65	4	23	53·0	26	26·0	18	13	...
,,		Winslow (Addington)	3·59	+ 1·14	·62	4	25	51·0	26*b*	23·0	24	13	17
IV.		Bury St. Edmunds (Westley)	3·82	+ 1·58	·79	4	21	52·0	26	26·0	19*g*	..	...
,,		Norwich (Brundall)	3·25	...	·33	4	26	52·2	26	24·8	19	10	24
V.		Weymouth(LangtonHerring)	5·65	+ 2·55	·81	5	23	50·0	28	26·0	21	8	...
,,		Torquay (Cary Green)	7·37	...	1·43	1	24	54·1	28	29·0	18	4	9
,,		Polapit Tamar [Launceston]..	6·72	+ 2·49	·81	13	25	52·4	26	22·0	18	8	11
VI.		Stroud (Upfield)	3·60	+ 1·15	·59	4	24	51·0	30	27·0	17	13	...
,,		ChurchStretton(Woolstaston)	4·40	+ 1·35	·81	4	23	51·5	26	23·5	1	12	24
,,		Tenbury (Orleton)	3·78	+ 1·41	·68	4	19	55·3	26	21·8	24	12	17
VII.		Leicester (Barkby)	3·37	+ 1·23	·48	4	24	52·0	26*c*	21·0	23	19	26
,,		Boston	2·68	+ ·83	·30	1*a*	22	50·0	25	26·0	16	9	...
,,		Hesley Hall [Tickhill].....	2·41	+ ·43	·44	4	20	55·0	26	20·0	1	16	...
VIII.		Manchester(PlymouthGrove)	3·56	+ ·12	·50	26	20	50·0	10	26·0	21*h*	17	18
IX.		Wetherby (Ribston Hall) ...	2·15	— ·29	·61	5	10	...	...	...	...	...	...
,,		Skipton (Arncliffe)	9·66	+ 2·85	1·63	29	22	..	...	...	...	...	...
,,		Hull (Pearson Park).	3·76	+ 1·49	·67	2	22	54·0	27	21·0	1	15	18
X.		Newcastle (Town Moor)	4·60	+ 2·30	·50	27	21	...	..	...	...	...	...
,,		Borrowdale (Seathwaite).....	19·27	+ 4·46	4·59	29	23	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	7·59	+ 3·04	·87	27	24	...	...	...	...	...	...
,,		Haverfordwest	8·85	+ 3·86	·91	10	29	52·0	7	25·9	18	4	20
,,		Aberystwith (Gogerddan) ...	6·16	+ 1·28	·93	6	25	48·0	30	16·0	17	...	...
,,		Llandudno.....	4·19	+ 1·23	·89	6	25	55·4	26	29·5	21	...	...
XII.	SCOTLAND.	Cargen [Dumfries]	5·86	+ 1·84	·89	29	17	53·0	26	21·6	1	14	...
,,		Jedburgh (Sunnyside).....	4·02	+ 1·82	1·50	17	22	52·0	26	18·0	1	14	...
XIV.		Colmonell	7·22	...	1·06	29	21	53·0	8	20·0	17*i*	13	...
XV.		Lochgilphead (Kilmory).....	8·01	+ ·64	1·19	29	21	...	...	20·0	16	15	...
,,		Mull (Quinish).....	6·48	— 1·09	1·00	25	21	...	...	...	...	...	...
XVI.		Loch Leven Sluices	6·30	+ 2·99	·90	26	18	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	5·25	+ 3·17	·70	6	24	54·1	26	23·6	1	12	...
XVII.		Braemar	4·51	+ 2·04	·73	4	23	50·8	26	9·3	23	20	24
,,		Aberdeen (Cranford)	7·25	...	1·03	6	24	54·0	26	25·0	15	14	..
,,		Cawdor (Budgate)	2·80	+ ·34	·48	6	19	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	4·31	— 1·46	·81	4	12	...	...	...	...	...	...
,,		Glencarron Lodge.....	7·13	...	1·29	30	21	51·6	26	19·0	18	14	...
XIX.		Dunrobin	3·88	+ ·51	·77	6	17	51·5	26	28·0	18	9	...
,,		S. Ronaldsay (Roeberry).....	5·28	+ 1·62	·90	10	25	48·0	25*d*	29·0	17	5	...
XX.	IRELAND.	Darrynane Abbey.....	7·31	...	·90	13	27	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	8·48	+ 4·84	1·47	8	23	51·5	2*e*	26·0	18	14	...
,,		O'Briensbridge (Ross)	6·23	...	·93	25	21	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	6·82	+ 3·70	1·37	8	23	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	4·19	+ 2·03	1·39	8	20	57·6	26	27·0	18*g*	5	23
XXII.		Ballinasloe	5·76	+ 2·34	·99	29	24	52·0	26	19·0	19	14	...
,,		Clifden (Kylemore)	12·35	...	1·82	29	27	...	...	...	...	...	...
XXIII		Waringstown	4·82	+ 1·78	·92	27	23	54·0	25	18·0	19	20	25
,,		Londonderry (Creggan Res.).	3·99	— ·22	·60	29	26	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·57	+ ·89	·74	29	20	50·0	25*f*	14·0	19	18	25

+Shows that the fall was above the average ; —that it was below it.

a—and 10. *b*—and 30, 31. *c*—and 28, 30. *d*—and 26. *e*—and 27, 31. *f*—and 29, 30. *g*—and 20. *h*—and 24. *i*—and 19.

METEOROLOGICAL NOTES ON DECEMBER, 1896.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

ADDINGTON.—A wet month, generally mild during the day, except from the 16th to the 22nd. From the 26th to the end, max. temp. rather high. Barometer very low on the 6th; a sprinkling of S on the 17th and 19th; large floods on 5th, 25th and 27th; fogs on 16th, 17th and 23rd.

BURY ST. EDMUNDS, WESTLEY.—S on 18th. The month has been wet and mild, and the past year has been the wettest year except 1872 (with 33·18 in.) in my 40 years' record, which I have now completed.

NORWICH, BRUNDALL.—Damp, gloomy and unsettled during the first fortnight, with rain daily; more seasonable in the third week. The last week stormy; bright and rainy days alternating.

WEYMOUTH, LANGTON HERRING.—The weather almost throughout the month has been very wet and unsettled. The mean temp. (39°·9) was as nearly as possible equal to the average. Stormy weather on the 4th, 5th, 6th and 13th. Fogs on the 21st, 26th and 30th. Lunar halo on the 14th.

TORQUAY, CARY GREEN.—Rainfall 4·09 in. above the average. Mean temp. 42°·8, or 0°·2 below the average. Duration of sunshine 40 hours 30 minutes, being 13 hours below the average; 11 sunless days. The rainfall for the year has been 8·02 in. below the average.

POLAPIT TAMAR [LAUNCESTON].—The wettest December during the past 16 years, the total fall exceeding the average by 2·52 ins.

STROUD, UPFIELD.—Gale on 9th. On 17th, a snowstorm at 2.30 p.m. (S ½-inch deep). Gale at night of 29th.

WOOLSTASTON.—A wet month, with a good deal of frost. Wild gale on the night of the 8th and 9th. S fell lightly on the 18th and 19th.

TENBURY, ORLETON.—A rather wet month, with an unusual amount of wind, temperature about the average. S only once, on the 17th. A cold spell from the 16th to 24th, during which time there was practically no thaw, though on no day did the thermometer remain below 32° all day. Frequent fogs and gales. During the last 65 years we have only had 4 drier ones than 1896—viz., 1844, 1854, 1864 and 1887.

LEICESTER, BARKBY.—A month of frequent rain and very variable Barometrical readings. Mean temp. 37°·5. S on 18th.

MANCHESTER, PLYMOUTH GROVE.—Dense fog on the 16th and 21st. A fall of snow on the 17th. End of the month as mild as May.

ARNCLIFFE.—A wet month, unusually free from snow.

SEATHWAITE.—Very wet from 23rd to 31st, total 14·56 in. 4·59 in. fell on 29th, 2·89 in. on 24th, 2·13 in. on 25th, and more than an inch on 27th and 30th.

WALES.

HAVERFORDWEST.—December commenced cold and gloomy, and much R every day up to the 18th. From the 4th to the 8th was excedingly stormy. On the 5th, from 9 a.m. to 12, the Barometer stood at 29·01 in.; with that exception, from the 5th onward the mercury was below 29 in. for 51 hours. Frost, alternated with storm and rain, during the whole of that period. S covered the Precelly range from the 15th to the 21st. From the 21st to the end, very wet and gloomy, with higher temperature.

ABERYSTWITH, GOGERDDAN.—Very wet throughout, and very little sunshine.

SCOTLAND.

CARGEN [DUMFRIES].—Very changeable weather has prevailed during the month, the range of Bar. pressure approaching 1½ inches. A sharp spell of frost was experienced between the 16th and 23rd, the mean temp. for those eight days being 30°·5; during the remaining eight days of the month the mean temperature averaged 41°·1. During the nights of the 30th and 31st stiff breezes blew from S W.; light winds, however—mostly easterly—generally prevailed. Aurora was observed on the 15th, and T was heard on 31st. Sunshine was only registered during 37 hours, and there were 16 entirely sunless days. The unsettled weather has not been favourable to stock wintered out of doors, and sheep folded on turnips have had anything but comfortable quarters; the mild weather experienced during the last few days of the month has, however, freshened up pastures, and farm work generally is well advanced.

JEDBURGH.—The leading feature of the weather has been its variableness, changes often twice a day. Little sun, but little fog; out-door work not much retarded. Little ailment in the community. Pink and white primrose in bloom on 26th; snowdrops appearing above ground 28th; snowdrops and yellow aconite in bloom on 31st.

COLMONELL.—Rainfall 2·26 in. above the average for 20 years. Mean temp. 1°·0 above the average. H on 12th and 15th. S on 15th and 16th.

ABERDEEN, CRANFORD.—The wind has been very light, and foggy weather right through the month, hardly one day bright.

S. RONALDSAY, ROEBERRY.—A very wet, windy month.

IRELAND.

DARRYNANE ABBEY.—Wettest month since November, 1892. Very sharp frost 16th, to morning of the 20th, rest of month rather mild, especially latter part. Very strong gale, force 11 Beaufort scale, for about five hours, on afternoon of 30th. H on 16th.

WATERFORD, BROOK LODGE.—Large Lunar Halo on 12th, S on the Comeragh and Carlow Mountains on 14th.

O'BRIENSBRIDGE, ROSS.—A considerable rainfall, making up for November deficiency. Temp. generally mild, only some light frosts, and of short duration.

DUBLIN.—A generally unsettled, open, rainy month. Mean temp. 41°·4, or 0°·1 above the average. Solar halos on 4th, 13th and 14th; a lunar halo on the 23rd. High winds on 12 days, but attained the force of a gale on only two occasions, the 26th and 30th. Foggy on the 4th, 5th, 11th, 13th, 20th and 22nd. No S or sleet. H on the 9th and 18th. Aurora borealis on the 3rd.

CLIFDEN, KYLEMORE.—The roughest month of the year, with rain, storm, and frost. The flood has been the highest for many years.

WARINGSTOWN.—A wet, mild month, except the third week, when there was a sharp frost.

OMAGH, EDENFEL.—The first fortnight was mild and rainy, with one or two short frosty intervals, the third week fine, clear and frosty, with little or no snow; the temp. on the night of the 18th fell to 14° in the stand, and to 10° on the surface of the ground. A remarkably sudden and complete change took place on the 24th, and the year terminated in persistent and continuous wet.

END OF VOL. XXXI.